

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF CONSERVATION
DIVISION OF FORESTRY

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American River Canyon

the State Forester's 1961 REPORT

EDMUND G. BROWN
Governor

WILLIAM E. WARNE
Administrator
The California Resources Agency

DE WITT NELSON
Director
Department of Conservation

ANNUAL REPORT

of the

CALIFORNIA DIVISION OF FORESTRY

for 1961

F. H. RAYMOND
State Forester

The State Board of Forestry

Whitford B. Carter, Chairman
Lancaster

Paul Aurignac
San Ardo

Leslie O. Cody
Red Bluff

Peter J. Cormack
Redlands

E. P. Ivory
Dinuba

Kelly B. McGuire
Ft. Bragg

Frank C. Myers
Fallbrook

THE CALIFORNIA FORESTRY

COMMISSION

WILLIAM E. JAMES

Administrator

Department of Conservation

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Administrator

The California Forestry Agency

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FOR 1935

BY E. H. HAYES

Forest Ranger

THE STATE OF CALIFORNIA

EDWARD G. BREWER, Governor

San Francisco

E. H. Hayes

Forest Ranger

William E. James

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Department of Conservation

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Paul Anderson

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REORGANIZATION OF GOVERNMENT

In 1961 the Legislature accepted Governor Brown's proposal to combine numerous departments of State Government into several Agency units to accomplish greater coordination of related work projects and to facilitate executive management in the office of the Chief Executive.

Upon the creation of the California Resources Agency, effective October 1, 1961, the Department of Natural Resources came to an end. However, no precise changes in authority or duties of the Board of Forestry or Division of Forestry were mentioned in the basic law. The Resources Agency is composed of the following Departments: Parks and Recreation; Conservation; Water Resources; Fish and Game. The Agency also includes the State Water Rights Board and the Water Pollution Control Board with each of its regional boards.

Governor Brown appointed William E. Warne as the first Administrator of the Resources Agency, and DeWitt Nelson as the Director of the Department of Conservation. That Department consists of the following four Divisions: Forestry; Mines and Geology; Oil and Gas; Soil Conservation.

The old Department of Natural Resources came into being on July 29, 1927, as a result of a similar major gathering of agencies by Governor C. C. Young. When first created it consisted of four divisions. These were forestry, parks, mines, fish and game. In the course of time, legislative readjustments were made in the scope of duties of the several divisions; and a major adjustment came with the departure of fish and game to form an independent department. Division of Oil and Gas, Soil Conservation, Small Craft Harbors, and Recreation were added, as was by executive order, a central Division of Administration.

Among the primary changes which the departmentalization of 1927 brought to the former State forestry organization were these. Management of parks was eliminated from Board of Forestry control; the Board lost practically all of its old executive authority and was designated as a policy-making commission; the State Forester was removed from membership on the Board and became an executive officer with the responsibility of carrying out Board of Forestry policy directions under the supervision of the Director of Natural Resources. Fire Control was the major activity until about 1945 when forest management could at last become a practical reality.

BOARD OF FORESTRY

During 1961 the State Board of Forestry held eight formal sessions. Two of the meetings were held in San Francisco, one in

Fresno and the remainder at Sacramento. A majority of Board members attended three hearings of the Assembly Interim Committee on Natural Resources, Planning, and Public Works. These hearings involved a public discussion of the 43,000 acre Harlow Fire in Madera County; a public hearing on roadside fires at Arbuckle; a public discussion about the procedures and effects of the Forest Practice Act held at Eureka.

As usual, the practical application of the Forest Practice Act occupied much of the Board's time in regular session. This occurs especially when appeals are made to modify the rules to permit alternate plans of forest harvesting or reforestation methods.

In 1961 the Board took formal action as prescribed by law to approve the formation of two huge zones. In addition to several smaller insect zones the Tule Zone of Insect Infestation, involving more than 402,000 acres was declared. After proper advertising and hearing the Eastern Tulare Hazardous Fire Area was adopted for recognition under the California Administrative Code. This area embraces 622,240 acres. Under the law certain regulations shall apply hereafter in respect to the hazardous use of fire and fire causing agents upon this declared Hazardous Area.

Again in 1961, the Board expressed its official opposition to the Wilderness Bill now before the House of Representatives. Members attended the Governor's "Dry Year Water Conference" held in Sacramento and Los Angeles in mid-summer. Members also assisted in the dedication of a new Conservation Camp at Mountain Home State Forest on July 8th.

Mr. McGuire and Mr. Ivory were appointed to sit as representatives of the Board of Forestry on several Timber Maturity Boards which are provided for in the tax exemption section respecting young timber in the State Constitution. Individual Board members are named to act in specific counties and for specific periods of time.

Many practical problems have arisen in putting this Constitutional Amendment of 1926 into effect. At its June meeting the Board of Forestry considered and adopted the basic Report of the Joint Timber Taxation Study Committee which has been trying to prescribe guidelines for determining timber maturity within the framework of the brief law. As suggested by the study committee, the proposal that the Attorney General be asked to give official standing to some of the findings and to answer several basic questions was endorsed by the Board.

At an early meeting, there was a comment upon some advertising of cigarettes in outdoor settings which tends to ignore or belittle the great hazard that careless smoking actually is known to be in some parts of the Nation, and of course throughout practically all of California wildland during much of the year. By resolution the State Forester was directed to correspond with the several tobacco product manufacturers. As a result a number of highly sympathetic

replies were received. Later in the season the Board of Forestry found it appropriate to commend the American Tobacco Company for the educational effort expended by that company toward forest fire prevention.

When a representative of the timber industry informed the Board that a petition was being put before the Fish and Game Commission to modify the deer hunting regulations to such an extent that an imbalance in the deer harvest probably would result, the Board formally requested the Commission to maintain its current system of a balanced deer population commensurate with other land management objectives.

Early in the season the Board of Forestry acknowledged the very serious fire situation confronting California. Plans and budgets developed by the Division to meet the contemplated emergency were presented to the Board in great detail. Thereupon the Board adopted seven major principles of preparedness and by resolution urged all forest fire protection organizations to consider and act upon this program of preparation and action. The Board commended these steps: to develop plans of operation, to train and develop qualified personnel, to effect and enter into an adequate communication and liaison system, to establish plans of fire control management, to research and develop fire fighting equipment and methods, to make a greater effort to prevent fires, to review and study fire control performance.

On December 13, at San Francisco, Chairman Kenneth Walker stepped down from the chair and tendered his resignation from that position. General Myers thereupon nominated Mr. Jeffry Prendergast as Chairman of the Board. By unanimous approval the 18 years of dedicated service as a member of the California State Board of Forestry (and a much longer period of general public service) on the part of Mr. Prendergast was thus acknowledged.

Because the long tenure of Mr. Prendergast was ended with this formal meeting of the Board of Forestry, another election was held with his resignation and request for further nominations. At this time Mr. W. B. Carter was elected Chairman and Mr. E. P. Ivory was elected Vice Chairman.

Another gesture of appreciation was placed on the record by the Board, and this was in fact the principal business brought before Chairman Prendergast. A resolution was unanimously passed commending the Division of Forestry and all its cooperators "for having held forest fire losses at the level sustained during the past fire season" in view of the great potential for losses in conflagrations which faced them.

DEPUTY MACE REPRESENTS THE DIVISION NATIONALLY

At Wood's Hole, Massachusetts, during July and August, leading scientists of the United States and Great Britain met as the Fire Research Committee of the Academy of Sciences' National Research Council. To this eminent assembly was invited Deputy State Forester James K. Mace, of the Southern California District.

The subject of Mace's presentation was titled "Forest Fire Department Organization and Attack Planning." He told of steps followed in determining fire hazard and risk, and the physical means developed to prevent and suppress forest and watershed fires. Mace illustrated his paper with graphic and narrative descriptions of several very large Southern California wildfires.

In October Mace attended the Fire Services Staff and Command School at Battle Creek, Michigan, as a guest lecturer. The School was conducted by the office of Civil Defense of the Department of Defense for fire specialists of this nation. The Division was also represented at this School by Deputy State Forester George Grogan of the Sierra-Cascade District.

THE FIRE SEASON

The weather situation during 1961 in respect to the probability of many fires and many large fires was extremely critical. On the basis of statistics it was among the worst on record. The seasons of 1959 and 1960 had been "bad". Now the drought of those years had extended its cumulative effect into the fire season of 1961.

Current seasonal weather throughout the usual mid-summer and early fall peak of fire activity presented no happy break in the long record of unfavorable conditions. Some little solace was derived, however, from the fact that an unusual intensity of thunder storms during August occurred in company with high humidity and spotty precipitation. Otherwise, the great number of known lightning strikes along the Sierra would have developed into a repetition of the disastrous fire losses in pine timber which occurred during 1960.

The winter of 1960-61 left Northern California with a below-normal rainfall record; the central State was seriously below normal; already parched Southern California recorded 30 to 40 percent of its well-advertised low precipitation normal. Then the sunshine and spring rains in Northern California served to forewarn firefighters that a lush growth of dry grass would cover most of the foothills throughout the summer fire season. And summer started early.

June and July were clear, dry and hot. Temperature readings broke many ancient records. Maximum readings of 110 to 116 degrees followed day after day in the interior valleys. Throughout the central

State leaves of the oaks and chaparral species were seared and blackened from excessive drought, a most unusual condition.

No person who bore any responsibility for the prevention or suppression of fire in the wild land of California was unaware of the awful potentiality of this combination of high fuel hazard and severe weather. Firefighting crews and their leaders knew that fast and aggressive suppression action on every fire start was mandatory if large and costly fires were to be prevented. In total, the responsible firefighters accomplished a magnificent achievement in view of the task with which they were confronted.

There were indeed some large and damaging fires. In fact, several of them have been selected as the subject of brief narrative reviews in the latter part of this Report. The large fires that did not, but well could have occurred are unknown and unreported. They are somewhere unidentified among the 2710 forest and watershed fires which were extinguished by Division crews before they reached a size of 10 acres. Although they are inaudible and unpretentious, these small fires, nevertheless, represent the proper justification for the expenditure of thousands of taxpayers' dollars used to train and maintain a dedicated corps of State fire crewmen.

The first half of September brought the worst possible element of fire weather, namely, strong north winds. Fortunately, widespread rains occurred north of Fresno on September 15. October was extremely variable in weather and some days were very critical for firefighters.

During several days in early November Northern California escaped a terrific wind storm which ripped through inland Southern California so fiercely that highways were closed to travel in that region.

During 1961 Southern California was quite fortunate in being spared from a repetition of the great wildfires that have devastated so much watershed and property values in past years - that is, except for the fire that may well claim the dubious distinction of being the most damaging in the history of this continent since the Berkeley Fire of 1923, the Bel Air Fire in the hills of Los Angeles.

For the third time, the number of timber-watershed type fires attacked by Division of Forestry crews during a season exceeded three thousand in number. The record shows 3207 such fires; and this does not include purely structural and vehicle fires occurring on that designated "forest" land.

Large fires are the worst fires for several reasons. Damage and cost of suppression increase far more rapidly than the arithmetic increase in acres burned. The Division suffered 87 fires in 1961 larger than the 300-acre class; in 1960 there were 37 and in 1959, 95.

One large fire is bad enough. When several are burning at the same time it can be safely assumed that adverse weather exists, and therefore the probability prevails that there will be more fire starts and more large fires. Such a situation presents the problem of obtaining enough forces to meet an existing suppression job without committing all reserve forces, and doing so in the face of cumulative exhaustion of the forces in action.

Fire control organizations cannot be established in such dimensions that the extreme emergency may be met with ease, for the simple reason of cost. Extended emergencies can be met only by developing an organization which can stretch its supervisory functions to absorb and properly direct reinforcements and to make the most of the forces at hand in a calmly studied manner. During 1961, the Division of Forestry was confronted with such a rigid test of its organizational stamina.

From the 3rd to the 14th day of September the Division Dispatcher's log book shows that there had been dispatched to large fires 6000 men, of whom 1500 were Division employees and 2500 were inmates from Conservation Camps and institutions. The remaining 2000 were from various sources. Fifteen hundred pieces of fire fighting automotive equipment were also secured from numerous sources and dispatched.

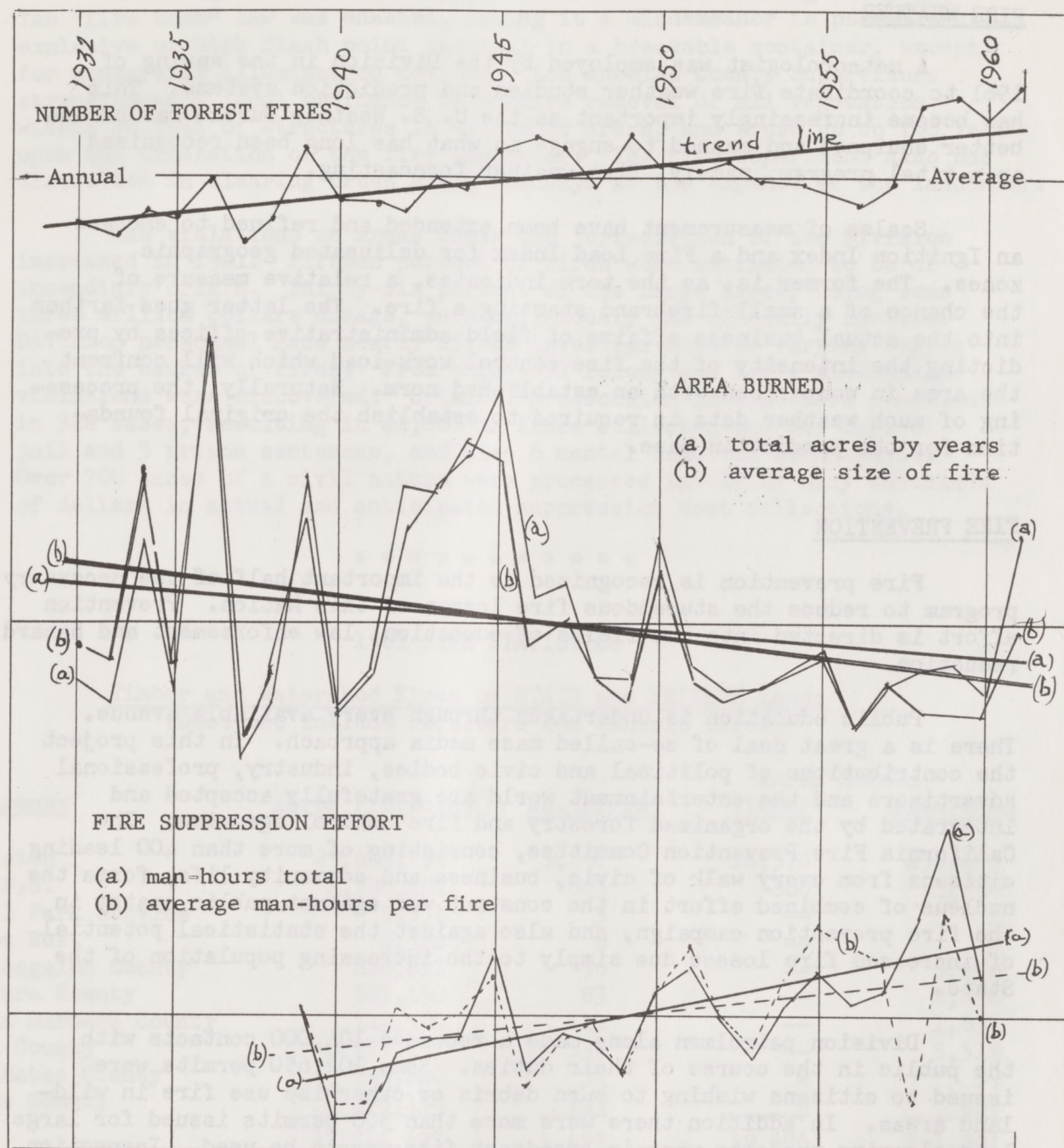
In forest-watershed lands protected by the Division there were about 314,000 acres burned. This is the largest area loss in some 15 years, but it is not unusual when measured against past drought periods. Records show that more than twice that area was burned in the dreadful 1936 fire season. And it happened that the great bulk of the 1961 loss occurred during a few days in July and in September.

The Regional Forester of the Forest Service in California, reporting upon the fire record in the 19 million acres of federal land protected within National Forests, stated that the incidence was very high with 2948 fire starts. This was obviously due to the greatest number of lightning strikes on record. These totaled 2123, as against the previous high of 1693 in the bad season of 1958. On the other hand, the area burned was kept down to approximately half of the average loss, being in total only 60,757 acres.

AIR ATTACK

1961 was the fifth season in which aircraft were used to make direct attack on wildland fires by the Division. Use of airplanes for detection and reconnaissance originated more than 40 years ago. With an appropriation of \$304,526 the Division was in a position to contract for service from seven air tanker bases and two helitack bases (Pratt Lookout in Humboldt and Badger in Tulare Co.) Standby private craft were thus made available during the critical part of the fire season. At the helitack fields, specially trained Division fire crews were stationed.

An additional \$330,557 was spent from emergency funds for air attack because of the severity of fires. There were 199 fires involved in such action and it was estimated that in 75 percent of the cases the action was effective. Detailed reporting of effects is required of ground and air personnel in this program because, to a large degree, it is still experimental as well as operational. A total of 875,400 gallons of "retardant" was dropped on fires this season. Bentonite clay and borate solution were used to spray burning vegetation or immediately ahead of the fire.



FIRE STATISTICS TRENDS BY YEARS

The above graphs (with trend lines) are based upon CDF annual totals for forest fires (Zones 1 & 2). Each rise and fall is properly related to the others because each annual figure is plotted as a percentage of the grand average for the particular graph. The upper graph shows the ragged but upward trend of forest fire occurrence from 1932 to 1961 inclusive. The middle graph shows: (a) total acres burned each year, and (b) the arithmetic average-sized fire. Lower graph shows one method of portraying suppression cost, i.e. man-hours fireline effort; (a) shows each annual total, and (b) shows average man-hours per fire each year.

FIRE WEATHER

A meteorologist was employed by the Division in the spring of 1961 to coordinate fire weather studies and prediction systems. This has become increasingly important as the U. S. Weather Bureau has become better equipped and manned to engage in what has long been recognized as a vital program, namely, fire weather forecasting.

Scales of measurement have been extended and refined to embrace an Ignition Index and a Fire Load Index for delineated geographic zones. The former is, as the term indicates, a relative measure of the chance of a small firebrand starting a fire. The latter goes farther into the actual business affairs of field administrative offices by predicting the intensity of the fire control work load which will confront the area in comparison with an established norm. Naturally, the processing of much weather data is required to establish the original foundation for the prediction base.

FIRE PREVENTION

Fire prevention is recognized as the important half of the necessary program to reduce the stupendous fire losses of this Nation. Prevention effort is directed into the fields of education, law enforcement and hazard reduction.

Public education is undertaken through every available avenue. There is a great deal of so-called mass media approach. In this project the contributions of political and civic bodies, industry, professional advertisers and the entertainment world are gratefully accepted and integrated by the organized forestry and fire control agencies. The California Fire Prevention Committee, consisting of more than 400 leading citizens from every walk of civic, business and community life, forms the nucleus of combined effort in the constant war against public apathy in the fire prevention campaign, and also against the statistical potential of increased fire losses due simply to the increasing population of the State.

Division patrolmen alone made a recorded 104,000 contacts with the public in the course of their duties. Some 102,650 permits were issued to citizens wishing to burn debris or otherwise use fire in wild-land areas. In addition there were more than 300 permits issued for large land clearing projects wherein broadcast fire was to be used. Inspection of hazardous industrial and recreational areas by Division personnel amounted to about 37,000 cases in 1961.

It was noted that 35 percent of all reported fires in the forest-watershed zone protected by the Division occurred along roadsides. Because of this the Division is always active in aiding and encouraging the removal of roadside fire hazards. More than 12 percent of fires originate in "dooryards", which is an ample indication of why permits to burn trash are required, and why constant education in their proper application is also needed. Children caused 15.38 percent of fires this year, and this, regrettably, is a slight increase in the type of fire which has long perplexed the fire prevention specialist.

There was no unusual modification in fire law during the year. The "fire bomb" law was enacted, making it a misdemeanor to possess an explosive or high flash point chemical in a breakable container, except for commercial illumination devices. Los Angeles County Supervisors strengthened a local ordinance to require removal of all vegetation within 30 feet of structures in watershed areas, and brush up to 100 feet upon the discretion of the fire inspector. The Fire Department also has discretion in clearing brush along roadways at the expense of the landowner.

Law violations on areas under the jurisdiction of the Division increased in 1961. Fifteen percent of fires were estimated to be of incendiary origin. Thirty-six percent of the large fires, doing some three million dollars damage, were maliciously and illegally ignited. Division personnel made nearly 15,000 investigations to varying degree into the causes of fires. From this, 652 felony and 4,674 misdemeanor violations were discovered. Criminal prosecution in some form proceeded in 322 cases, resulting in \$4,800 in fines collected and 605 days of jail and 3 prison sentences, and also 6 mental hospital commitments. Over 700 cases of a civil nature were processed involving many thousands of dollars in actual and anticipated suppression cost collections.

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1961 FIRE STATISTICS

Timber and Watershed Fires on STATE and PRIVATE Lands (Does not include structure and vehicle fires)

<u>Agency</u>	<u>Acres Protected</u>	<u>No. Fires</u>	<u>Acres Burned</u>	
			<u>Timber</u>	<u>Watershed</u>
Division	29,614,792	3,207	18,578	295,479
U.S.F.S.	4,792,201	685	800	1,950
Nat'l Park Service	5,551	3	--	1
Hoopa Res.	2,326	6	--	18
Los Angeles County	626,812	96	--	5,204
Ventura County	385,190	83	--	2,876
Santa Barbara County	742,500	111	--	1,697
Kern County	2,177,255	136	--	3,519
San Mateo County	199,810	57	2	39
Marin County	298,190	109	6	438
	38,844,627	4,493	19,386	311,221

All Division of Forestry Fire Crew Action

Forest and Watershed Fires Attended (Zone 1 & 2)	3,207
Structural type fires in forest-watershed (Zone 1 & 2)	1,945
Rural zone under Division protection (Zone 3)	6,606
Fires attended in U.S.F.S. border area	147
City fires attended by rural CDF crews	681
False alarm runs	2,129
Miscellaneous emergency calls	49
	14,764

DIVISION PERSONNEL

During 1961 the Division of Forestry was supervised by the State Forester, his Chief Deputy, eleven Deputies and 13 men of Assistant Deputy rank. There were 56 Rangers in three classes, 51 Associate Rangers and 174 Assistant Rangers. There were 98 employees in various technical forestry and engineering classes.

In Conservation Camps there were 31 Superintendents with 33 Assistants, and 238 Project Foremen. There were 456 Firefighter Foremen and 157 Equipment Operators. Of 340 Firetruck Drivers there were 249 maintained yearlong. All of the approximately 1700 Firefighters were employed only throughout the fire season which varies from seven to ten months in California. There were 105 Lookout Observers and 185 Camp Cooks on the payroll.

Most dispatchers bear the title Assistant Ranger but three are titled Fire Dispatcher. Throughout the Division there were 175 clerks employed during 1961. Full Division of Forestry employment at its peak during the summer totalled about 3,890 persons.

TRAINING

A considerable problem in giving adequate training to Fire Truck Drivers confronts the Division because of a large termination of employment in the class; 110 men left the job during the year and 42 others were promoted. Some were employed only on a seasonal basis to offset the shortened work-week. Only 160 Drivers passed through the Division's two Training Center courses during the year, mostly because of the physical limitations of the plant. More local training will be developed to meet the need.

At Chino Institution for Men a training unit was established for the purpose of teaching inmates skill in handling tools and in fire control techniques. After six months of operation it appears certain that the State benefits by easier and quicker integration of inmates into fire crew groups, more work efficiency, and undoubtedly more satisfaction among the trained inmates in their personal accomplishments.

The Central Sierra Training Center staff (through District Three) issued an interesting and informative report titled "Your Training Center, Its Work and Its Purpose."

CONSERVATION CAMP PROGRAM

The California Conservation Camp Program in which selected wards of the Department of the Youth Authority and inmates of the Department of Corrections are employed on conservation projects under supervision of the California Division of Forestry continued to expand in 1961.

Alder Conservation Camp near Klamath in Del Norte County, a current standard 80-man camp, was opened on March 18, 1961.

Washington Ridge Youth Conservation Camp near Nevada City, built to accommodate 80 wards in structures patterned after the Mt. Bullion Youth Conservation Camp design, was completed and first occupied on September 11, 1961.

Adjustments were made in the total population by the elimination (with three exceptions noted below) of "temporary increases" which had resulted in some uncomfortable overcrowding made necessary by the expansion of the program in 1959. Magalia Conservation Camp in Butte County, built in 1949 to accommodate 60 inmates remains at 80 with provision being made for a permanent expansion to this capacity in the near future.

Vallecito Conservation Camp near Angels Camp in Calaveras County continues to maintain a temporary population of 100, 20 over the normal capacity. Oak Glen Conservation Camp near Beaumont in San Bernardino County remains at 80, although designed to accommodate a 60-man work force. All other camps at the end of 1961 were at their normal population level, as originally designed or modified. There were, operated jointly by the Division of Forestry:

In cooperation with the Department of Corrections:

21 permanent Conservation Camps with	1620 inmates
3 mobile Conservation Camps with	120 inmates

In cooperation with the Department of the Youth Authority:

4 permanent Youth Conservation Camps	285 wards
3 spike Youth Conservation Camps	60 wards
31	2085
-----Totals-----	

Conservation camps under construction to provide for the continued expansion of the program include the following: Intermountain, in Lassen County, where construction of camp buildings was completed late in December, 1961, in preparation for opening in 1962. Deadwood, near Fort Jones in Siskiyou County, where construction continues on schedule which should permit opening the new camp prior to the 1962 fire season.

Antelope, which will be the first of its kind, is being built into and will operate as a part of the Conservation Center under construction near Susanville in Lassen County. The Forestry Superintendent position has been filled to develop an adequate work program and direct the procurement of equipment, tools and supplies necessary for the operation of the forestry program undertaken by Antelope Conservation Camp which is scheduled for activation late in 1962.

Acquisition continues on sites for the Konocti Conservation Camp near Lower Lake in Lake County, Mono-Inyo Conservation Camp near Bishop in Inyo County, Black Mountain Conservation Camp near Cazadero in Sonoma County, and Cuesta Conservation Camp, a special arrangement which will permit the Division to work an 80-inmate complement directly out of the Correctional Institution known as "Men's Colony" at Los Padres in San Luis Obispo County. The Division is in the process of leasing buildings and space at the now inactive U. S. Army Camp San Luis Obispo to provide office, warehouse, shop and vehicle storage for the various functions associated with the Forestry Work Program.

The three 40-man mobile camps remained at the same locations during 1961; one at the future site of the Konocti Camp, one on the grounds at Deadwood Camp, and one near California Hot Springs in Tulare County.

A summary of the total work program reveals that the near 645,000 man-days of effort expended by Conservation Camp workers in 1961 were divided as follows:

<u>ACTIVITY</u>	<u>Time Involved</u>	<u>% of total</u>
Forest Fire suppression	698,425 Man <u>hours</u> *	12.8
Camp Services and tool Maintenance	126,590 Man <u>days</u>	18.5
Hazard reduction, firebreak construction and maintenance	121,868 " "	17.9
Truck trail construction and maintenance	74,265 " "	10.9
Forestry utility systems maintenance and development	35,919 " "	5.3
In-camp projects	46,722 " "	6.9
Nursery work, planting and forest demonstration	18,440 " "	2.7
Forest insect and disease control	8,668 " "	1.3
Miscellaneous conservation work	34,258 " "	5.0
Public campground and recreational development	37,855 " "	5.5
Game and fish habitat improvement	7,197 " "	1.1
Other miscellaneous including training, rescues, and so forth	82,222 " "	12.1

A total of 5,450,847 man hours were expended by camp workers in the operation of the Conservation Camps and the Forestry work program in 1961. This compares with 4,649,335 in 1960 and 2,977,370 in 1959.

*Forest fire suppression activities which frequently involve many hours a day on the fireline, to accurately reflect the total effort are shown in Man-hours. All other activities are listed by Man-Days reflecting the normal effort on the basis of an 8-hour day.

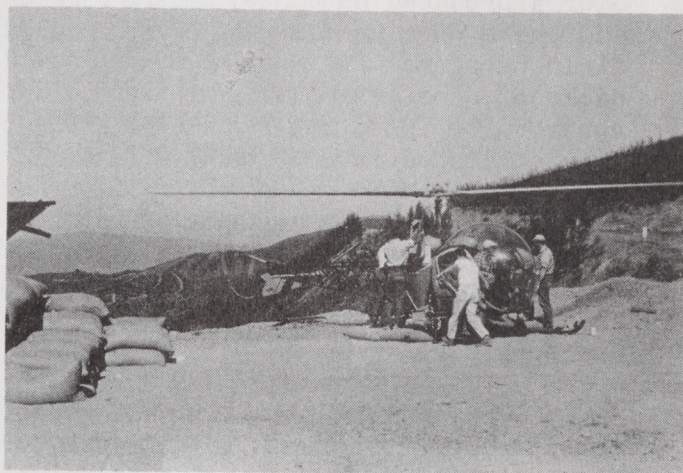
EMERGENCY REVEGETATION OF DENUDED WATERSHEDS

The Division cooperated with soil conservation districts, water and flood control districts, and local and federal agencies in the emergency revegetation of 46,389 acres of fire denuded watersheds during 1961. For the most part, this emergency revegetation consisted of the aerial seeding of fast-growing annual ryegrass. Successfully established, this grass will materially reduce erosion and excess runoff upon critical watersheds.

As in past years, the State shared 50 percent of the cost of seeding private lands in the nine projects undertaken. This amounted to approximately \$25,000, an average cost to the State of 71 cents for each of the 35,000 acres seeded. Almost one-third of the total area involved reseeding the Bel Air-Topanga burn in Los Angeles County.

Division specialists furnished technical guidance, arranged for seeding and evaluated the results of earlier seeding projects. Seed trials, established with the cooperation of the Pleasanton Plant Materials Center were continued and expanded in 1961. Several species have indicated promise and are being closely observed.

Ridge top seed loading operation of a helicopter during the revegetation of the critical slopes denuded by the Austrian Gulch Fire in Santa Clara County.



RANGE IMPROVEMENT

Specialists among the Division's range and fire control personnel assisted many California range landowners during 1961. This assistance was in the form of individual contacts, group demonstrations, and distribution of special publications. Public interest centered around the control of undesirable vegetation and the reseeding and fertilizing of range land.

Recommendations regarding the use of fire for range improvement were issued to 329 individuals obtaining burning permits. These individuals used fire, often in combination with mechanical treatment and herbicides, to control undesirable vegetation on 85,252 acres. Nearly 30,000 acres were seeded with desirable plants. Although most burns are conducted to improve grazing for livestock, 26 were conducted to improve game habitat. During the burning of some 55,688 acres, Division fire crews stood by in the event of the fire's escape. The average size of control burns during 1961 was 360 acres.

The Division's six range improvement study projects provided demonstrations and tours. Demonstrations included aerial and ground application of herbicides, seeding, "frilling" undesirable oaks, and measuring forage production by clippings and actual grazing.

NURSERIES AND REFORESTATION

Poor cone crops for several years preceding 1960 were reflected in the production of nursery stock during the 1960-61 season. The number of trees distributed from the Division's four nurseries dropped from 4,000,000 to 3,175,000. Much of the stock produced was used to reforest an estimated 3,748 acres of State, other public land, and private land.

An additional 2,147 acres of private land was reforested by seeding, mostly in the north coast area. This total of 5,736 acres reforested was 84 percent of that treated in 1960. The decrease occurred undoubtedly because a few large landowners in the north coast area did not repeat large scale seeding projects, and partly because less planting stock was available. Notwithstanding the decrease in overall acres planted and seeded, forest industry and other industries with forest land increased their purchases of trees by about 21 percent. Production of pine species in the nurseries was adequate, but demand for Douglas-fir and true firs was considerably greater than amounts available.

The cone crop of 1961 was almost a total failure. Pines in the Sierra produced no cones. True firs had cones only in isolated areas and these were heavily infested with insects. During the season Division field personnel and inmate crews from Conservation Camps collected 1,506 sacks of cones which yielded only 625 pounds of clean seed. This is in contrast to 1960, the record year for cone collections, when 5,784 sacks were collected from which 7,823 pounds of seed were processed. Douglas-fir was collected in Humboldt County only, and again, the cones were badly infested with insects. Yield of clean seed was slightly more than half of normal. Samples of infested cones were sent to the University of California Department of Entomology at Berkeley where studies indicate that at least six different species of insects may be working in red fir and Douglas-fir cones.

Survival of plantations throughout the State varied considerably, ranging from 20 percent in one area to 80 percent in another. In the southern Sierra, because of successive years of drought and poor survival, Agricultural Stabilization and Conservation Committees have suspended approval of federal financial assistance for planting practices.

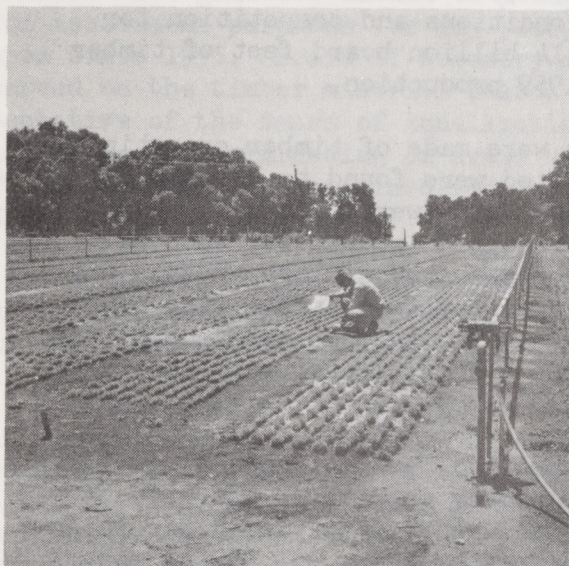
The Advisory Committee to the State Forester on Reforestation Methods and Procedures met twice during the year. At its meeting in March the committee reviewed data from reforestation studies being conducted by the Division on State Forests and the five projects established in recent years in cooperation with landowners on private land. The committee recommended to the State Forester that the Pacific Southwest Forest and Range Experiment Station be requested to publish a simple standard design for reforestation field studies. Such a design should assist both public and private foresters in laying out studies that can be evaluated readily and be suitable for statistical analysis.

In October the committee took a field trip to one of the Division's nurseries and four of the cooperative reforestation study projects on private land in the northern and central Sierra. A particularly encouraging project conducted entirely by the Winton Lumber Company in Amador County was also visited. Slopes covered with dense stands of bear clover were terraced by bulldozer, exposing strips of bare soil. Rodent control

measures were applied and the 1960 natural seed fall from scattered seed trees resulted in an excellent stand of seedlings in the exposed strips.

Seed improvement studies continued. Hybridized seeds collected from Jeffrey pine which had been artificially pollinated with pollen from an insect resistant natural cross of Jeffrey and Coulter pine were sown in one of the nurseries. Seeds from ponderosa pine pollinated with pollen from the drought resistant Apache pine were also collected and sown. Pollens were furnished by the Forest Service Institute of Forest Genetics at Placerville. Approximately 2,500 hybrid seedlings are available for a small scale seed orchard planting in the spring of 1962. Grafting scions from select Douglas-fir, another method of establishing a controlled seed orchard for improving progeny, was not successful. Grafts in the field on the Jackson State Forest failed, but a few were successful where young trees grown in containers were used as root stock.

Los Angeles County Forester and Firewarden reported that some 100,000 trees were planted by his Forestry Division, and about half of the plantings were on watershed land where the prevention of erosion is of special interest.



Ben Lomond Nursery, Santa Cruz Co.
Taking inventory in 3-month old
Monterey pine seedlings which have
average density of about 40 per
square foot.



Gualala Reforestation Study,
Sonoma Co.
Testing selectivity of herbicides
on Douglas-fir planting, using
a backpack mist blower.

THE FOREST PRACTICE ACT

A considerable quantity of fire-killed timber was salvaged in 1961 even though logging activity in general declined due to depressed market conditions. In the State's forest practice program the most significant progress was manifested by the vigorous law enforcement action taken. This culminated in the holding of the first three administrative hearings in California for the revocation of timber operator permits for failure to comply with forest practice rules.

Amended forest practice rules for the Coast Range Pine and Fir Forest District were approved and adopted by the Board of Forestry and became effective July 20, 1961. The rules were revised to conform to the Forest Practice Act (as amended by the State Legislature in 1957), to meet changing conditions, and to improve the efficiency of enforcement. The rules for the other three forest districts were amended in 1959 and 1960.

With 395 timber operator permits issued and 342 terminated, there remained at the end of 1961 a total of 2,152 valid permits. Many of these permittees did not operate, and changes in organization required others to apply for new permits because permits are not transferable. The number of active timber operators decreased from 1,598 in 1960 to 1,510 in 1961. This decline was due largely to market conditions and competition for stumpage. Operators reported cutting 5.14 billion board feet of timber in 1960 which was 13 percent below the 1959 production.

During the year 2,440 inspections were made of timber operations. Statewide, 87 percent of all items inspected were found to be in compliance, while 1,778 infractions of the rules were observed. Nearly half of the infractions involved hazard reduction practices, such as snag disposal, slash abatement, and firebreaks around slash areas. Other rules most often in non-compliance involved erosion control, fire plan filing, and failure to post fire rules. Repeat inspections showed that almost half of the areas where infractions had previously been observed were brought into compliance.

Law enforcement efforts were intensified, as mentioned above. The Division sent 1,053 violation notices to timber operators. Permits of eight timber operators were revoked for failure to comply with the rules and one operator was placed on probation for three years. By the end of the year eight litigation reports were on file with the Attorney General for prosecution against persistent violators of forest practice rules. Twelve litigation cases were dropped during the year: two when the violations were corrected, one after the death of the offender, and nine due to the three-year statute of limitation. Six new litigation cases were being prepared by the Division at the close of 1961.

Under the Forest Practice Act, 89 owners filed affidavits to convert 45,801 acres of timberland to purposes other than forest growth. Some 82 percent of the acreage was intended for grazing while the balance was for other agricultural use, removal of trees for construction, and water and urban development. Eight alternate plans and one amendment to an alternate plan were approved by the Board of Forestry in 1961 to accomplish greater silvicultural or protectional management of the lands than was provided for under the district rules.

Much public attention was focused on the Forest Practice Act in 1961. Articles expressing dissatisfaction with the program were published by the Sierra Club and the Isaak Walton League. The State Chamber of Commerce urged the Board of Forestry to initiate a study of timber harvesting practices in California to determine the effectiveness of the Forest Practice Act. In September the Board appointed a committee to develop guidelines for such a study to be conducted by the University of California School of Forestry.

A hearing on the Forest Practice Act was conducted by a State Assembly Committee in Eureka on October 19. Testimony was given by the State Forester, Attorney General's Office, the Sierra Club, the Redwood Forest Practice Committee, the Humboldt County Forestry Committee, and various industry spokesmen. Suggestions for improvement emphasized the need for making owners responsible for compliance as well as operators, a more equitable penalty provision than permit suspension and revocation, and more effective administration through efficient procedures and adequate enforcement staff.

TIMBER TAXATION

There was much activity in the timber taxation field during 1961 in respect to the (State) constitutional elimination of taxes on young timber. The greatest amount of young-growth timber was declared mature for assessment purposes for any year, almost doubling the acreage acted upon since 1955. Board of Forestry members Kelly B. McGuire or E. P. Ivory served on the timber maturity boards in three counties along with a representative of the Board of Equalization and the County Assessor. Staff assistance in examination of areas was provided by Division headquarters. Two new counties became involved during the year, namely, Del Norte and Sierra.

Maturity board declarations were made on 79 properties with an area of 114,881 acres in three counties during 1961. To date 296 properties involving 258,898 acres have been declared mature in five counties.

Mendocino County embarked on a major program to have virtually all the young-growth timber over 40 years of age declared mature. The maturity board utilized the criterion that the timber shall be mature if it is a class which is generally and substantially dealt in and sold or operated within the county as commercial timber. Heretofore, maturity was determined only if the owner had commenced cutting of the young-growth timber. Both Del Norte and Sierra counties used the former criterion also. Some 22,833 acres of Jackson State Forest in Mendocino County were declared mature, thus making that timber subject to future payment of in-lieu taxes.

The joint timber taxation study committee of the Board of Equalization and Forestry completed its work during the year. A report on a pilot study of young-growth timber taxation in Mendocino County, guided by the committee and conducted by the University of California, was published as Bulletin 780 of the Agricultural Experiment Station. Dr. Henry Vaux, committee chairman and Dean of the School of Forestry was the author. The committee developed a revision of guidelines for maturity declaration which was referred to the Attorney General for concurrence. There were two questions which the committee was not able to resolve. The questions of the taxability of residual timber when 70% or more of the original

growth was harvested, and secondly, whether the young-growth tax exemption stipulated in the Constitution applies to the third and successive crops, were referred to the Attorney General for legal opinion. Decision on these matters is expected in early 1962.

Young-growth redwood land after recent logging operation. Residue of seed trees is required by Forest Practice Act. This and similar areas were originally cut 60-80 years ago. Now the timber has been declared a taxable value because it obviously is used as a commercial product.



PEST CONTROL

Forest insects, disease, and animals continue to cause large scale losses to California forests. This damage is estimated to exceed 1.3 billion board feet of timber annually. No estimate has been made of the effect on forest growth.

The California Forest Pest Control Action Council increased its activities through its four committees--Insect, Disease, Animal, and Southern California. The Council at its annual meeting approved a Bark Beetle Prevention publication, an Aerial Photo Study on an insect problem area in the Central Sierra, recommended forest agencies and private industry include insect control plans pre-control and post-control evaluations in critical areas where warranted, called attention to several problems now widely distributed in California forests that threaten to become major problems as California moves into large scale planting and intensive forest management, asked the Fish and Game Commission to retain its present management policy and recognize that deer are produced on private as well as public land and that management of the herd should be compatible with primary land management objectives, and commended the Citrus Experiment Station at Riverside for its work on "X" Disease of southern California.

There were 291 forest pest detection reports submitted by Division personnel in 1961. These reports and those sent in by other

persons and agencies have lessened the need of a large scale aerial survey of the State. All large infestations have been reported through the cooperative detection reporting system initiated by the Pest Council.

There are 15 approved zones of infestation in California comprising 8,568,640 acres. In 1961 the Division initiated nine direct forest insect control projects whereon 9,424 trees were treated at a cost of \$43,257. Conservation Camp crews were used to accomplish nearly all the work. In some areas, due to lack of landowners interest no direct control was initiated.

Control of white pine blister rust continues through the eradication of Ribes bushes. Within California there are 211,686 acres of private land and 12,280 acres of State land within zones of infection. In 1961 no control work south of the Merced River was performed. The cost to the State in 1961 was approximately \$83,000 on 54,266 acres of private land and 873 acres of State land. Conservation Camp crews were used wherever possible. The U. S. Forest Service supervised field eradication projects.

Experimental aerial spraying of infected sugar pine on private land, using the antibiotic Phyto-Actine, was tried for the first time in California. It is hoped that this chemical and the antibiotic Acti-dione will prove to be a valuable aid in the future.

Animal damage was on the increase in 1961. Deer were particularly destructive in the north coastal area to both natural and planted seedlings. Reports were also checked of squirrels stripping bark from young redwood trees. Porcupine damage appeared to level off this year.

The Division has four active cooperative research projects with the University of California involving forest pests. One project with the Department of Entomology and Parasitology consists of studying the population dynamics of bark beetles and two with the Department of Plant Pathology are concerned with investigating control of dwarf-mistletoe and "X" Disease of pines in Southern California. The fourth project with the Department of Zoology at Davis involves forest rodent control.

Administrative studies conducted cooperatively with the Forest Service include the production of sugar pine resistant to white pine blister rust and the use of Acti-dione in controlling western gall rust. Another study on Latour State Forest with the Department of Plant Pathology, University of California is concerned with the forms of Dwarfmistletoe on red fir and white fir and its rate of spread.

SERVICE FORESTRY

Ten service foresters are employed by the Division to help forest landowners put their properties under good forest management. Because more than one-third of our forest land is in small ownerships, future timber production is dependent on these small properties as well as on large industrial ownerships. Most of the tens of thousands of owners of small forest properties do not have the knowledge of forestry necessary to make their tracts fully productive. Service foresters furnish the professional knowledge to help the owner manage his woodland.

The Division received 2,222 requests for assistance in 1961. The 1,884 owners that were helped controlled 282,313 acres of forest land. Service foresters advised owners on the planting of 3,706 acres, thinning and stand improvement on 5,272 acres, and the pruning of trees on 1,255 acres. Such assistance and advice saved 28,000 acres of young timber from premature harvest and impractical land use conversions. Owners were assisted in the sale of 5,500 acres of timber. Gross receipts to owners from timber and Christmas trees wisely harvested and utilized amounted to \$1,154,000. Service foresters also referred 126 owners to forest consultants and industrial foresters where large timber sales or heavy management expenses indicated the desirability of more intensive professional service. These Division foresters are located in Fortuna, Willits, Santa Rosa, Redding, Oroville, Sacramento, Camino, Monterey, Fresno, and Riverside.

Typical open young-growth ponderosa pine competing with heavy undergrowth of manzanita and other "succession" brush species. Note lower dead limbs on pines which will result in loose knots in the future lumber crop unless trimmed.



Young ponderosa pine stand with competitive undergrowth removed by mechanical means. Probability is high that this area will naturally seed well to pine if rodent population is kept under control. This clearing was done as an Agricultural Conservation Program practice.



STATE FORESTS

The Division manages 70,238 acres of land in eight State Forests. These Forests are used to demonstrate and investigate prudent methods of timber and land management.

Three of the State Forests contained old-growth timber when acquired. One of the first jobs in managing a forest property is to bring virgin and overmature stands into a growing condition. According to carefully made management and logging plans harvesting by contract sales was begun in 1946. Since then over \$5 million income has been paid into the State Treasury. In 1961, 29.519 million feet of timber were sold, bringing, with the sales of other forest products, a sum of \$728,223 to the State.

The development of areas of old-growth timber accomplishes another important purpose. In the process of selling the timber large areas of the Forest are made accessible for future management. Building permanent high standard logging roads is an important part of the sales program. This year, $9\frac{1}{2}$ miles of high standard main roads and lower standard spur roads were constructed.

Some cutting also took place in younger stands. On the Jackson State Forest in Mendocino County a controlled experiment has been established in an 80-year old Douglas-fir and redwood stand (see photos). This area in Caspar Creek has been cut under four different silvicultural methods: group selection, light and heavy tree selection, and clear-cutting. Study in future years will determine which method will result in the best yields, both in quality and quantity of timber. In cooperation with federal, University and State foresters, watershed managers and fish biologists, a study of water yield and sediment production is planned in the same watershed. Costs and returns for each harvesting method are studied. Ease and promptness of renewing the timber stand in each case is also an important consideration.

Experimental work receives high priority on all the Forests. On the Latour State Forest in Shasta County studies on reforesting brush fields continue. A Marden Brush Cutter was tested here as well as various chemical brush control methods. A new survey of soils and vegetation was made at Latour. This survey provides a more scientific planning tool to use in selecting areas for conversion from brush to timber.

On the Mountain Home State Forest in Tulare County, planting and stand improvement experiments were established. This Forest is especially valuable for demonstrating the compatibility of recreation and timber production under careful management. A recreation plan was developed and a new campground was constructed there in 1961.

To manage a forest wisely one must know growth rates, the amount of timber standing in the woods, and the amount of timber cut and lost to other causes. Each of these items is a difficult problem in measurement for the forester. In order to intelligently set sustained yield quotas and goals these measurement problems must be solved. On all the State Forests, foresters are field-testing new and more economical and efficient measurement techniques. On the Jackson Forest the field work for a "continuous forest inventory" was completed. This inventory is a statistically designed series of permanent plots used to follow the growth

and development of the forest over the years. The inventory will be computed by machine card processing and electronic computers. This will save man-years of computations and allow for computation of detail not otherwise possible. It is one of the first such forest inventories in California and will serve as a model and demonstration for other forest owners. On all the Forests modern methods of timber measurement (cruising) are tested and reported to the timber industry and timber owners.

Ownership of land and timber presents many technical and custodial tasks such as the granting of rights-of-way and leases for special use. Permanent study plots must be established and re-measured. Over 1200 acres of timber were cruised intensively this year, and 68 miles of boundary line were surveyed. Nearly 150 miles of road and trail were maintained on a total system of about 300 miles. A bridge was built and 14 others were maintained.

Protection from fire, insects and disease is essential to good forestry. No fires were reported on State Forests. This record can be attributed partly to prevention effort. Over 2,300 snags were felled on nearly 1,000 acres; 8 miles of roadside were cleaned up and slash was treated on nearly 500 acres for fire prevention and hazard reduction. Over 1300 acres were treated for insect and disease control. Improvement of young stands and planting and seeding were accomplished.

Conservation Camp crews provided much of the labor required for hazard reduction, road and trail maintenance, insect and disease control and experimental projects in the Forests.



Clear-cut redwood and Douglas-fir young-growth about 80 years old. Dominant trees average 2 feet diameter. Slash cleared and various regeneration methods being tested.



Same test area as photo at left. Light selection cutting has removed 1/3 of volume. Similar cuts will be made here every 20 years.

SOIL-VEGETATION SURVEY

During 1961 considerable progress was made on the soil-vegetation survey of California's wildlands. This inventory of soils and vegetation of the foothill and mountainous areas of the State was started in 1947. It is designed to identify and map the different kinds of soils and their associated natural vegetation, and to obtain accurate basic information on distribution, characteristics, relationships, and uses of soils and vegetation for development of sound plans for management of these natural resources.

In 1961, field mapping was carried on by two crews, and a total of 313,000 acres was mapped. Humboldt County was completed this year by October and then field mapping was begun in the upland portions of Sonoma County. The second crew, augmented by two experienced men during the summer season, completed field mapping of 227,000 acres in Shasta County. Samples of 21 different soil series were collected in Humboldt and Shasta counties for laboratory analyses to assist in identifying and characterizing these soils.

Maps (at 2 inches equals one mile) were published during the year on which was shown detailed information about soils and vegetation on approximately 377,000 acres in Humboldt and Tehama. In addition, quadrangle maps involving about 109,000 acres in Shasta were nearly ready for publication.

Work of the project was accomplished through contract with the Pacific Southwest Forest and Range Experiment Station and the University of California. One Division forester was assigned to the Station to work with field crews.

RESEARCH AND DEVELOPMENT

The pattern of research and development sponsored and engaged in by the Division was quite similar to the previous year. The legislative appropriation for 1961-62 was identical, namely \$164,764 to develop 15 projects, plus \$23,474 to be allotted to the San Dimas Experimental Forest and \$110,581 for the wild land soil vegetation survey (described above in this Report). In addition, of course, there were numerous small practical investigations carried out independently by Division personnel or as supplementation to those formal studies which have been undertaken by other agents with the financial aid of the State.

The Division allotted \$86,556 to the University of California to support nine projects. These studies involved fire protection economics, seed tree effectiveness, physiology of planting stock, control of forest rodents, forest growth prediction, use of California hardwoods, control of dwarfmistletoe, bark beetles and the pine "X" disease.

The Division contracted with the Pacific Southwest Forest and Range Experiment Station in the total sum of \$68,191, for research in watershed management and chemical fire retardants. Incidentally, one Division fire specialist is regularly assigned to the Experiment Station where he acts in a liaison capacity and assists in fire research. He is maintained at federal expense.

A fire climate study at the Station is heavily involved with microclimatology in selected spots throughout the State. One test area embraces portions of Lake and Napa counties where it was suspected that a time lag in great summer weather phases was the cause of erratic winds as well as poor forecasts of anticipated fire weather. Evidence thus far tends to bear out the suspicion that the effect of inland invasions of cool marine air into the hot Sacramento Valley is delayed in reaching the rugged Napa-Lake mountain complex and then causes such strange phenomena as afternoon down winds on east facing canyons. The same conditions appear to hold in areas under investigation in San Diego County.

The School of Forestry made field observations of Division fire control operations during the summer in pursuing the study of fire economics to try to draw some solid conclusions in the very knotty problem they have tackled for the Division. Fire prevention and suppression economics are founded upon such abstract, vague and indeterminate factors, and the material value of small bits of knowledge accumulated may be so great, that it has been deemed worthwhile to provide for independent research in this field regardless of the difficulty of the task.

The University of Southern California has contracted with the Division to whittle away at an equally abstract problem. This is essentially the exploration of the human psychology which leads to wild land fire from all the innumerable human causes, malicious and otherwise.

Cooperating with the Forest Service, the Experiment Station and Los Angeles County, the Division continued investigations of chemical fire retardants and fire barriers (commonly referred to as Fuel Break Project). In the former study the State of Nevada is also a substantial cooperator.

Some of the cooperating parties have published information which pertains to various aspects of investigations in which the Division has made a financial or direct contribution. The titles and source of the publications are listed under Publications in this Report.

This odd picture reflects an instant in the life of Dendroctonus brevicornis. It is an x-ray taken through the bark of ponderosa pine at the University of Calif. in a cooperative study with the Division. The purpose is to learn more of the life cycle of the Western pine beetle.



DIVISION OF FORESTRY BUDGET - Fiscal Year 1961-62

(1)	GENERAL SUPPORT	\$ 18,636,612
(2)	FOR OTHER AGENCIES protecting State and private State responsibility land	2,625,220
(3)	EMERGENCY FIRE FUND	2,000,000
(4)	BLISTER RUST CONTROL	80,000
(5)	INSECT CONTROL	20,000
(6)	FORESTRY AND FIRE RESEARCH	<u>298,817</u>
(7)	TOTAL ABOVE	\$ 23,660,649
(8)	CAPITAL OUTLAY	5,707,596

Explanation of above budget:

- (1) In previous years this item had included retirement contribution of State, but change in format of budget now consolidates entire Department of Conservation. The item therefore now omitted. Change in work week for fire crews from 120 hours to 104 hours resulted in \$718,000 increase; assumption of fire protection in San Mateo adds \$118,000; remaining increase over prior year can be attributed primarily to merit salary increases.
- (2) The allotment of funds to other agencies for protection of State and private land for which the Division is responsible increased over the previous year by \$288,000; essentially a reflection of changed crew work week.
To Kern \$376,159; Los Angeles \$512,839; Marin \$119,244; San Mateo \$68,067 (6 months); Santa Barbara \$182,234; Ventura \$188,428; U.S.F.S. \$1,178,249.
- (3) Depends upon length and severity of fire season.
- (4) Paid to U.S.F.S. in matching expenditures for field projects.
- (5) To be expended in approved cooperative abatement projects in areas of serious infestation.
- (6) Includes \$110,581 soil-vegetation mapping; \$23,472 to San Dimas
- (7) Includes federal aid paid into State Treasury of \$1,198,200. Also includes \$409,215 reimbursement from U.S.D.I. for protection of scattered public domain of some 3.6 million acres. Does not include over \$2 million reimbursement by 24 counties for rural-structural protection. Does not include \$670,900 paid into General Fund as income from nurseries and State Forest products.
- (8) Funds expendable during 3-year period. Includes \$3,000,795 earmarked for conservation camp construction and equipment.

NARRATIVE REPORTS OF SOME LARGE FIRES

When Professor George Stewart wrote the best-selling novel *Fire*, he had obviously discovered an untouched field of high human adventure to be translated into popular literature. Stewart made his composite (but very believable) forest fire itself the hero, that is, the subject of primary interest. There is not the slightest intention of trying to emulate that exciting story in the narrative histories of a few selected fires which follow in this Report.

In the first place, our histories are as factually accurate as the log books and eye-witness accounts can make them. Excitement and dramatic emotions are the last things that should be allowed to color log books or the work and reports of professional firemen. Because that is true, it is believed that the most honest record of a bad fire season is soon lost to the average citizen who suffers part of the fire loss and pays part of the suppression cost. It is hoped that our narrative records will preserve something of value not to be found in the formal file records of the several fires.

Lastly, it should be known that the fires selected as narrative subjects were not selected because of their "bigness" alone. The selection was made primarily to explore in narrative style some different peculiarity of region, or weather, or burning behavior of each of them.

In respect to bigness, the following among the ten largest fires extinguished by the Division of Forestry in 1961 will not be found among the narrations which follow. The Rancheria Fire started near Fiddletown on September 2nd and was controlled three days later. It burned 28,400 acres of grass, brush and woodland and destroyed 30 structures, including 10 homes and a school gymnasium valued at \$244,000. The Springs Fire of Butte and Tehama counties started a day later and was controlled on September 9th. It burned 28,950 acres, endangered Richardson Springs Resort and burned into Bidwell Park on the outskirts of Chico.

Soap Butte Fire in Tehama burned 12,400 acres of brush and woodland. It started on September 8th and was controlled the next day. On September 2nd Kelsey Fire started at a lumber mill and burned west to Coloma, destroying 10,000 acres of brush, grass and timber during its three days of life.

Before daylight on June 27th, near La Grange in Tuolumne Co., a fallen power line in a high wind started a fire which was controlled by 10:15 p.m. that same day after it had burned 12,200 acres, including land in Stanislaus and Mariposa counties. On July 19 and 20 Clay Station Fire burned 11,240 acres of brush, grass and woodland in Amador County.

The Bollinger Fire of July 12 to 17th along the rough boundary of Santa Clara and Stanislaus counties burned 19,000 acres. Its toll in the form of fire crew exhaustion undoubtedly had a detrimental effect upon the initial effort to control the Austrian Gulch Fire which is described at some length later in this Report.

Something must be said of the greatest of all the fire catastrophes even though it has been told well by the agencies most directly responsible. This was the Bel Air Fire of Los Angeles and its neighbor, the Topanga Fire.

On November 6th at 8:15 a.m. the former conflagration began, under conditions not precisely known, near Mulholland Drive and Beverly Glen Drive. Topanga Fire started about $4\frac{1}{2}$ hours later, some six miles to the west in Topanga Canyon. At dawn of November 8, Bel Air Fire was controlled and by midnight Topanga was surrounded. Together they had burned 15,500 acres and consumed 514 structures.

Many beautiful homes were destroyed and structural damage was estimated at approximately \$25,000,000. In addition, a great watershed loss was suffered and evidenced by the floods and debris which inundated the surrounding lowlands within a couple of months when heavy rains struck the denuded slopes.

A tremendous effort was put forth by the City and County of Los Angeles fire forces to control the fires and reduce the loss. They were assisted by many cooperating parties. (See Fireman, Dec. 1961, pub N.F.P.A., Boston).

The entire story is much too involved to pursue here. In respect to the Division of Forestry, however, it should be reported for the record that this agency sent 32 firetrucks, 15 Conservation Camp Crews, 95 overhead personnel and a fully staffed fire camp assembly with fireline tools. The State Forester visited the scene and Governor Brown was kept continuously informed of the situation through the Division's central dispatching office.

THE GUERNEVILLE FIRE

Sixteen air miles to the northwest of Santa Rosa lies a mountainous, timber covered region 7 miles long and 1 mile wide generally known as the Russian River recreation area, where during the summer months tens of thousands of people congregate to enjoy the vacation pastimes of swimming, camping, picnicking, horseback riding or just plain relaxation. The steep hills are densely clothed by young redwood and Douglas-fir timber, or by a closed canopy of spreading woodland composed of tanoak, madrone, pepperwood, maple and oaks. Where past fires and soil erosion have deteriorated steep south faces, there are sometimes patches of dry chaparral. Thousands of summer cottages have been built in the flats and along the canyon slopes.



The community of Guerneville is the center of this area and absorbs the largest percentage of the population influx. On Friday evening, Sept. 1, 1961, a steady stream of traffic up the 101 Highway and west converged on Guerneville; thousands of people from the San Francisco Bay area and other parts of central California were enroute to celebrate the long Labor Day weekend. It was estimated that 150 thousand people would be in the area by Saturday.

People responsible for fire protection throughout the Russian River resort area have long been fearful that during some period of unusually adverse weather and great crowds a disastrous fire would occur.



(photos of this fire are
by courtesy of Santa
Rosa Press Democrat)

The day when ten million dollars of property was destroyed in Berkeley, on September 17, 1923, this very redwood region had suffered a fire calamity also. And strangely, that fire of 38 years ago started almost exactly where the fire described in this writing had its origin. In three hours the 1923 fire had burned in great leaps from Guerneville to the Pacific Ocean.

As the day dawned on Saturday the Guerneville area was quiet as it usually is in most vacation spots early in the morning. However, at the California Division of Forestry's Mt. Jackson Lookout located three air miles northeast of Guerneville the observer was up early attending to the normal morning duties and feeling somewhat uneasy because of the prevailing weather conditions. The weather readings at the lookout at 7 a.m. were temperature 60, humidity 44, wind NE 20. The wind had been increasing in velocity all night and the observer knew that as the day progressed the humidity readings would become critically low. By noon the humidity had dropped to 12 percent, fantastically low for the redwood region. Wind velocity had increased to 30-32 mph. Northeast winds in the Sonoma Ranger Unit can spell disaster, and when the lookout at 7:45 a.m. radioed the weather conditions to Unit headquarters the uneasiness spread. At 8 a.m. State Forest Ranger Jack Kessler ordered his dispatcher to notify all fire services and news media in Sonoma County of the extreme fire weather conditions that could be expected for the weekend.

The Division crew stationed in the Armstrong Grove State Park, two miles north of Guerneville, felt the same uneasiness when they awoke at 6:30 and felt the warm wind blowing through the normally cool and damp redwood groves at the park. This crew was especially fearful of these critical days because they had been making initial attack on fires all summer that were of incendiary origin and they were fearful that the incendiary* would strike again on a critical fire weather day such as the one they could foresee this morning.

One mile north of Guerneville at the base of what is known as Pool Ridge runs Watson Road, a narrow dead-end county road lined with summer homes and cabins. At approximately 10 a.m. an automobile carrying three occupants was observed proceeding very slowly towards the end of the road; approximately 20 minutes later the same vehicle was observed returning to the main highway. At this time two men working on a cabin a short distance away observed two thin columns of smoke a quarter of a mile apart raising near the end of Watson Road. Both men thought it was strange that anyone would burn trash in such windy weather, but believing it was only trash burning they did not report the smoke.

Mt. Jackson Lookout was unable to observe the two smokes because this particular road is in a blind spot. Also the high velocity of the wind was holding the smoke down and out of the observer's field of vision.

At 10:35 a.m. a local resident returning to his home from a trip to town discovered the two fires. He immediately telephoned to the Guerneville Fire Protection District. Within 5 minutes after the first alarm three fire district trucks and the Division fire truck from Armstrong Grove were on the scene. But extreme fire weather conditions was already at work

*Regrettably, dictionary makers have not yet discovered this natural word used by foresters to substitute for the legitimate noun incendiary. There being arsonists; why not "incendiaryists"?

against the firemen. As the initial attack was being made a group of four large Douglas-fir trees "crowned" and threw burning needles and cones over a wide area, starting new fires which immediately roared up the steep sides of Pool Ridge.

At the time of the first report additional fire equipment and a bulldozer had been dispatched by the Ranger Unit Headquarters in Santa Rosa, also Assistant Ranger John Hess was notified and dispatched. As these additional forces arrived a combined effort was made to hold the fire to the steep slope on which it had originated. But again Mother Nature took a hand and scattered burning embers to the south and west for a distance of 1/2 mile, creating new fires on a separate slope. By noon some 300 acres of timber and watershed was on fire in two separate locations; one house had burned and approximately 50 other structures were directly threatened. It was during this initial attack period that the Division of Forestry's bulldozer crew was trapped. Promptly the operator dug a hole with the dozer and he and his helper crawled into the hole, using the blade for a shield against the flames. This quick thinking by the operator undoubtedly saved their lives.

Upon his arrival Assistant Ranger Hess had assumed the role of Fire Boss, and foreseeing a fire of major proportions ordered additional manpower and equipment. Division and Conservation Camp crews were mobilized as were volunteer fire departments, Fire Protection District and California Disaster Office fire trucks. An emergency fire camp was also ordered and set up at the Armstrong Grove State Park which was to become the nerve center of the campaign.

Meanwhile the Division's "move-up" strategy had started, manpower and equipment were being alerted and dispatched from all parts of the State.

By the middle of the afternoon the two fires had joined and burned to the outskirts of Guerneville. An attempt was made at this time to hold the head of the fire on the Pool Ridge truck trail, which had been constructed by the CCC boys about 25 years ago for this very purpose. Air tankers from Ukiah and Hobergs had been grounded all morning because of the airport wind conditions. They were now able to take off. Flying low and dropping liquid chemicals the tankers attempted to cool down the head of the fire as it reached the ridge but they were soon called off because of turbulent air conditions. The tanker pilots later said that it was the roughest conditions under which they had ever worked.

As the head of the fire crested Pool Ridge the wind, which was now blowing 30-32 mph, carried burning embers 3/4 of a mile westward across Hulbert Creek Canyon (North Guernewood Park) and started innumerable spot fires. By midnight of the first day approximately 2,000 acres were burned and the reports of improvement losses were mounting; 15 residences, 5 other structures and a trailer house thus far. The fire was now burning from two directions into the thickly populated Hulbert Creek Canyon with the west head of the fire threatening the summer homes at Northwood and Monte Rio.

At approximately 1 a.m. the fire was spotting across the Russian River to the south near the community of Villa Grande. Fire equipment was rushed to this area and with the use of a mobile loudspeaker unit the citizenry was advised of the situation and advised to protect their homes

from the falling embers. In Hulbert Creek Canyon and Northwood area the people did much to protect their homes. In many instances it was observed that the women and children would leave the areas but the men would remain to assist the firemen. No mass evacuation orders were given although plans were made to do so if it became necessary. It is believed that if full evacuation orders had been given many more structures would have been lost as there was simply not enough fire equipment available to protect the 1,400 structures that were directly exposed to this fire.

During the first day the traffic problem became so great that the California Highway Patrol and Sonoma County Sheriff's office were called upon to set up road blocks so the fire equipment could move. Every available highway patrolman and deputy sheriff was called to duty and their assistance in the fire control effort deserves special mention. In view of serious fire threat in other Units of the District and, in fact, statewide during this first day, the efficiency of the Division's dispatch and move-up system was commendable. By the morning of the second day, Sunday, Sept. 3rd, there had been supplied to this fire some 740 men and 154 pieces of equipment. Included were 22 Conservation Camp crews (8 of which were flown in from Southern California), 20 California Disaster Office fire trucks and crews, 24 volunteer and Fire Protection District trucks and crews, 11 Division of Forestry fire trucks and crews, 3 Division bulldozers and crews, 51 Division overhead, 149 volunteer and paid pick-up labor, the Sonoma County Juvenile crew, a helicopter and reconnaissance aircraft. Private industry and the County of Sonoma provided 19 bulldozers, 5 transports, 8 waterwagons and other miscellaneous equipment.



Looking southwest over Guerneville. Fire is burning on two fronts. To right in upper Hulbert Creek (Mission Canyon) and to left (south) toward Monte Rio.



Northern extension of photo at left. Fire started at lower right at foot of hill. Note that spur road from Pool Ridge Truck Trail held the fire on ridge to right.

To relieve office dispatchers and field officers at a time when fire control business demands their full concentrated effort, the position of Public Information Officer was established by the fire manager on the first day of the fire. A special telephone line was installed for his use at the fire camp. By the first evening the telephone calls and personal interviews with the press, TV and radio became so heavy it was necessary to add two more people to assist. Also with the additional assistance it was possible to give guided tours of the fire line to the photographers and reporters. This meant that a much more accurate news story reached the public.

On Sunday afternoon, a second major fire occurred approximately 8 air miles to the southwest of the Guerneville fire. This necessitated a call for additional manpower and equipment and put a heavy strain upon the reserve resources. Some personnel and equipment from Guerneville were temporarily assigned to this new fire until additional forces could be moved in. This fire occurred on the ocean slope and because of the normally brisk coast winds it burned 1800 acres and seven structures before it was controlled.

It is interesting to note that during the first day and until the afternoon of the second day the heavy smoke and resultant falling debris was being blown away from the town of Guerneville and other resort areas to the lee of the fire. Because of this the vacationers (except those who had homes threatened) felt somewhat secure and went about their play or watched the fire from safe vantage points. However, when the wind shifted and the smoke settled in a heavy, choking blanket over the entire area, causing a visibility condition so severe that auto headlights were needed during the middle of the day, the populace began to grow nervous. They could not see in which direction the fire was moving and many believed it was actually coming back toward town. This fearful uncertainty caused an exodus Sunday evening and by Monday morning the traffic problem which had so severely hampered equipment movement had practically disappeared.

Late Sunday evening, backfiring operations were started on the northeast line and progressed satisfactorily during the entire night. Firebreak construction was also being carried forward on the north line.

Because of the lack of parking facilities at the fire camp the CDO fire trucks were placed in a truck pool next to the Guerneville Firehouse and were dispatched from this location to wherever needed.

At 2 a.m. Monday morning a call was received from the Forestville Fire Protection District reporting that they had several structures on fire in the Hollydale summer home area which is five miles up the Russian River from Guerneville. Four CDO units, plus 3 Division fire trucks were dispatched to assist the two trucks from Forestville. Upon arrival it was found that four summer homes and an acre of timber were blazing. The fire was burning up a very steep slope toward several other homes. Hard hitting initial attack, however, soon had this fire under control, thus averting another disaster.

Monday morning the 4th saw a great improvement in conditions on the fireline with the exception of the extreme northwest corner where difficulty was encountered because of steep terrain and logging slash. During the day more manpower and equipment, as it became available from other

areas, was pushed into the fight and by 10 p.m. Monday evening the fire was contained. Full control was declared at 6 p.m. September 5th.

The total loss: 5,769 acres, \$499,721 in estimated timber damage, sawlogs valued at \$12,500; 18 residences and 5 miscellaneous structures, 4 vehicles, 2 trailer houses and 2 bulldozers partially burned. Watershed damage and recreation loss was estimated at \$505,769. The grand total of damages was \$1,183,215.

The dollar damage to real property was computed, but how does one figure the losses to the 1400 property owners who lost several years of enjoyment from once green forest around their homes, or the business loss. Merchants and resort businesses lost thousands of dollars. And there was, for example, the chicken rancher near Watson Road whose 30,000 chickens quit laying eggs and went into molt because of the smoke and excitement. There were the salary losses of all those who donated their time to suppress this disastrous fire. It is roughly estimated that all of the losses and costs would exceed $2\frac{1}{2}$ million dollars. What will be the effect upon the steelhead spawning streams after the winter rains?

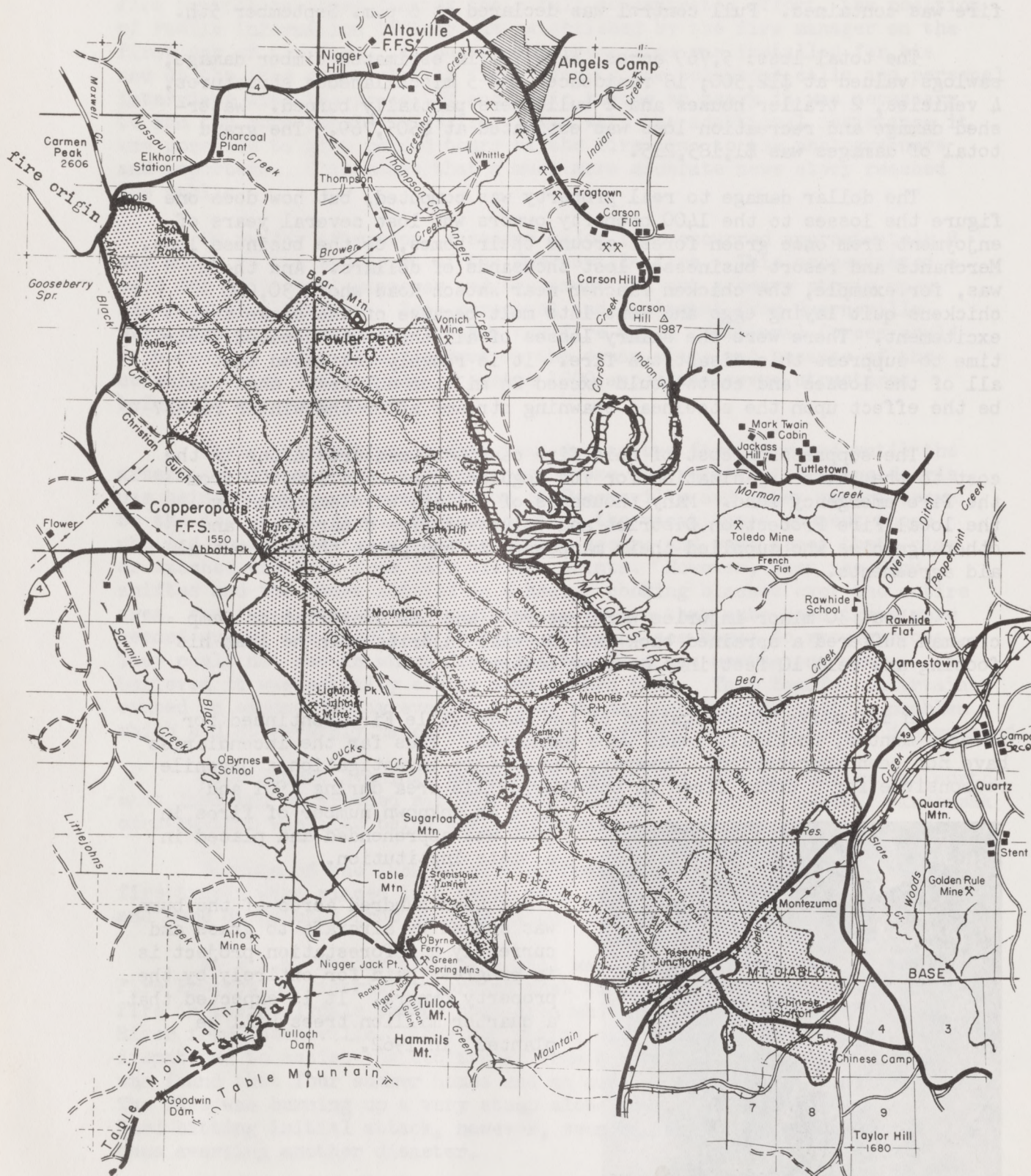
The suppression cost of this fire cannot be measured alone in the cost to the State organization for its regular forces and \$90,000 from the fire emergency fund. Many thousands of dollars were expended by the local Fire Protection District and volunteer fire departments and other agencies who supplied their manpower and equipment through mutual aid agreements.

About 30 minor injuries were recorded and one Conservation Camp crewman suffered a sprained back and internal injuries when he lost his footing and fell 10 feet into a creek bottom.

An intensive investigation of the Guerneville Fire continued for several months, until all leads were exhausted. Thus far the incendiaries have not been apprehended. However, during this investigation a juvenile responsible for 9 other fires in the Guerneville area during 1961 and also an unknown number of fires in 1960 was apprehended and placed in a State institution.



Eighteen hundred acres of the burn was seeded by aircraft to grass and currently a reforestation project is in progress paid for entirely by the property owners. It is expected that a quarter million trees will be planted in 1962.



HIGHWAY 4 - NO.1 FIRE

HIGHWAY 4, NUMBER ONE FIRE

There is strong circumstantial evidence that at the hour of 2 p.m. July 9, 1961, some local resident did ignite a fire along State Highway 4, in the County of Calaveras, about seven miles west of Angels Camp.

Associate Ranger Walter Mueller, in the temporary absence of Ranger Miles Young of the Division's Calaveras Ranger Unit, assumed the responsibility for directing fire control operations.

The fire spread rapidly as the hot prevailing winds pushed it in a southerly direction throughout the night. But at daylight on the morning of the 10th a report from the scene declared that a shaky line had been established around the 8200 acres of burned area. A hundred men had been engaged in the fight.

Strong winds from an unusual northeast direction were reported from Fowler Lookout and other high points on this day. The hour of 10:20 a.m. came and passed and the men on the uneasy fireline had no knowledge, and probably would have had little interest in the fact that 70 miles down the Sierra foothills another illegally set fire was sending its first plume of smoke above the skyline of the Middle Fork of Chowchilla River.

The two fires were to have a remarkable similarity in burning history during the next several days because both were to come under the influence to two culminating weather factors, namely, a strong wind at approximately 5000 feet elevation and the passing from a high point of fuel inflammability to an ultra-high hazard condition. The boiling point of this witches brew was reached at 4 p.m. on July 11th.

But Highway 4, Number One was to become a fire of serious proportions even before that hour. This fire sneaked over a weak link in the line about 2 o'clock on the afternoon of July 10th and began its rapid southeasterly advance again.

More men and heavy equipment were requested by the Fire Boss as the flaming perimeter expanded. But Division Headquarters Dispatcher at Sacramento had five other large running fires spotted on his action map at the moment, and demands coming up from District Dispatchers had to be judiciously considered. Nevertheless, in the course of the next couple of days there were assigned to this fire a total of 75 experienced leaders, 229 regular Division crewmen, 311 Conservation Camp crewmen, 63 firetrucks, 14 bulldozers, 7 airtankers and 3 dropco and reconnaissance planes.

Early morning of July 11th saw the fireline about seven miles from the point of origin, with 11,500 acres burned. Fire Boss Mueller estimated that 8 percent of the line was open and running free. Before nightfall the story was much worse in spite of the fact that Melones Reservoir formed a dependable eastern barrier as the fire swept on its southeasterly course.

By approximately 4 p.m. the fire had traveled in a swath about four miles wide to the Tuolumne County Boundary, a distance of nine miles from point of origin.

Ordinarily the Stanislaus River should have provided a strong natural position to meet the advancing head of the fire and kill it. This would have ended a vigorous 50-hour struggle with a loss of about 16,700 acres of brush, grass and oak woodland burned in Calaveras County.

But the usual serious fire weather did not prevail at this particular moment; it was considerably worse. Great convection currents of hot air, after rising several thousand feet, could be said to have been snapped over backwards by the heavy winds aloft, causing heat and fire-brands to be thrown on a wide front across the river into Tuolumne County. Down in the Ahwahnee region of Madera County, Harlow Fire began to develop into a devastating fire storm at the same time and for the same reason.

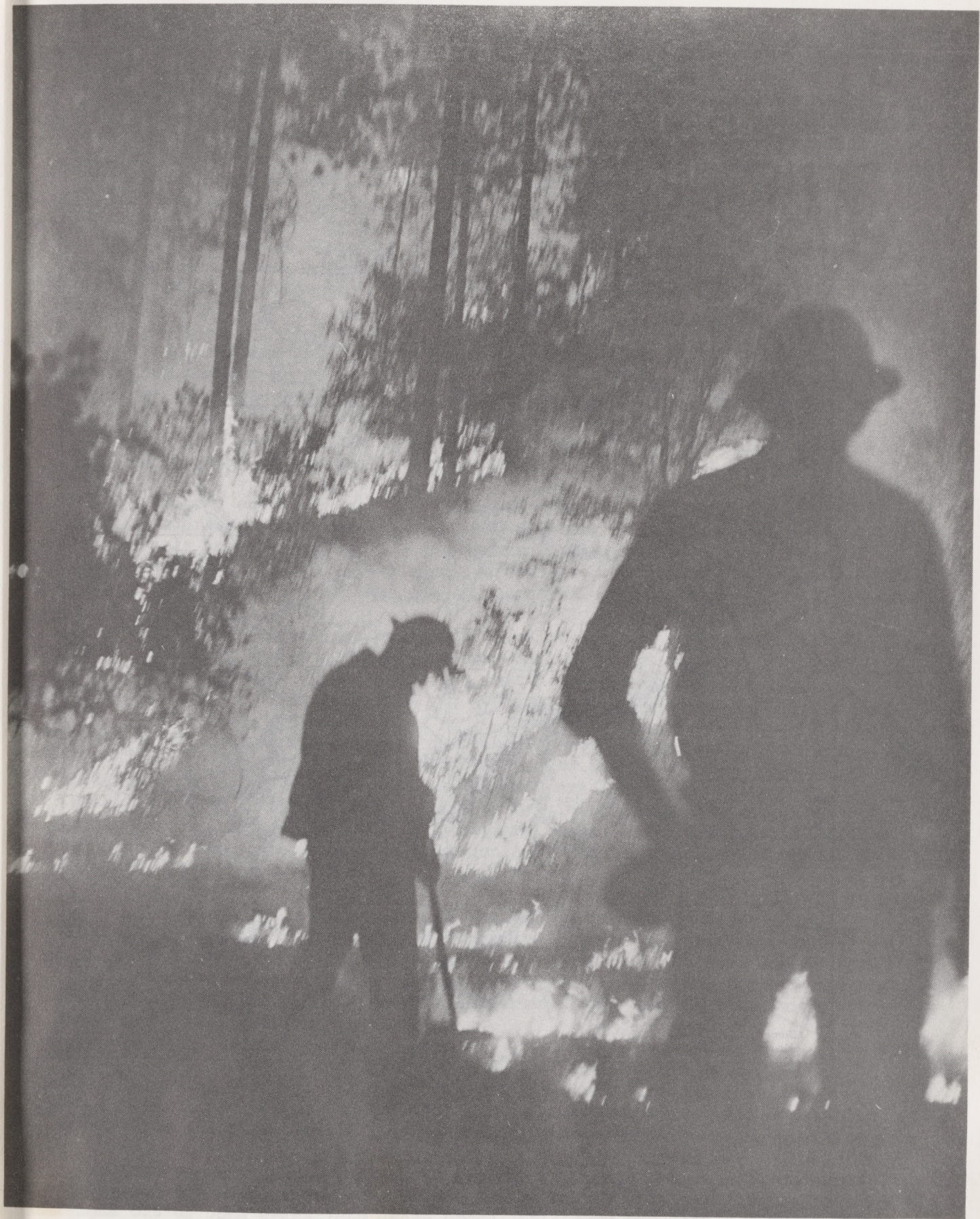
Ranger Jack Amundsen of Tuolumne Unit now assumed Fire Boss responsibility for this fire which began to split out at both flanks. Southerly it reached O'Byrne's Ferry down the Stanislaus River, and to northeasterly the fire spread as far as Jamestown. On the morning of July 12, once again a dubious fire containment was reported with over 8300 acres burned in Tuolumne County. Once again the fire broke away and during the next 24 hours burned another 2000 acres.

At 4 a.m. on July 14, four and one-half days after starting, Highway 4, Number One Fire was controlled after burning 29,300 acres and doing a damage conservatively estimated at \$100,000.



→
RANCHERIA FIRE, Amador County,
night of Sept. 3, 1961

(photo by Sacramento Bee)





HARLOW FIRE

THE HARLOW FIRE

The Middle Fork of the Chowchilla River under Stumpfield Mountain is broken land, thinly populated and vegetated by grass, open oak woodland and patches of dense brush. From May until the first heavy rains of fall of every year the countryside is high inflammable. After the concentrated drought of three winters the natural vegetation was practically explosive on this tenth day of July, 1961.

Forces of the State Division of Forestry's Mariposa Unit were weary and overworked when this hot day dawned. Crews had been obliged to work many hours of overtime on earlier fires; heavy equipment was in need of repair.

Ranger Frank Crossfield and his Associate Ranger, Tom Perkins, were directing the mop-up action on a 90-acre brush fire in the northern part of their district when the first wisp of smoke out of the Middle Fork became visible to the Division's Green Mountain Lookout. The recorded time was 10:19 a.m. Within minutes reports came from U. S. Forest Service stations at Miami Mountain and Signal Peak.

Lookout observers were unusually tense in this hazardous weather. Daily temperatures had been reaching 110 degrees. The Fire Index for brush fuels had risen above the mid-summer high normal of 15 to a frightening mark of 38. Usual wet stream courses were dry this year and each day strong parching winds came out of the north.

The smoke signal was quickly triangulated in on the Harlow Ranch about six miles from Usona Fire Control Station. A 18 year old youth had started the fire to clean up some debris. He had heard, he said, that fire in the brush and woods was good for the country.

Five minutes after the first lookout report a State crew from Usona was on the road. The Forest Service crew from Jerseydale Guard Station left within minutes because the National Forest Boundary was within three airline miles of the fire's origin. Six minutes after the first report Ranger Crossfield, the primary responsible fire control officer in his Unit, was on his way. A Division crew from his base station at Mariposa was rolling at 10:28.

Immediately after the initial attack forces were on the road, Mariposa Dispatcher began alerting other crews including the Youth Conservation Camp at Mt. Bullion. Distant crews were ordered to move and "cover-up" the weakened areas of his domain. (10:28 a.m.; Guadalupe Lookout reports the fire). The Mariposa County Road Department was requested to furnish a bulldozer transport truck.

Fresh in memory that day was the 11,000-acre Nelson Cove Fire of 1959 which had burned in this general vicinity and which could well serve as a pattern of destruction for this wisp of smoke which was still actually unknown to the fire officials as to origin or potential.

Twenty-one minutes after first report, at 10:40 a.m., the first crews arrived. Harlow Fire was now a mere acre in size. It was beginning to sneak out of open grass into dense brush, but there was little wind at the

moment. Such fires are always treacherous but this one could be handled if the upslope edge were extinguished promptly.

The crews knew their business and went rapidly to work with hand tools. But their first four minutes of grace was not enough time. A gust of wind upslope drove the flames against the fighters and they ran back to save their lives.

From this moment until dusk two days later Harlow Fire was its own master. The toll: two dead; 106 structures destroyed with much valuable property; 41,200 acres of grass, brush and timber burned upon a scarred landscape four miles wide and 14 miles long.

At the peak of the fire 2556 men and 118 pieces of motorized equipment were being directed to bring it under control. Many agencies of government and private parties deserve to be remembered for their stalwart effort to subdue the monster. The official report is voluminous and starkly dramatic in the very brevity and unemotional entries made in the formal logs and records. Among the stricken citizenry there was grief and loss and hastily spoken criticism; enough of the latter, in fact, to cause the Assembly Legislative Interim Committee on Natural Resources, Planning, and Public Works to hold a formal hearing in the City of Fresno on October 30, so that all points of view could be aired and discussed. (See Fresno and Madera newspapers of Oct 29, 30, 31, 1961).

Harlow Fire was a great calamity by almost any measurement. A full telling of the technical aspects of its history would require many pages. The one salient feature of this particular great fire was the "blow-up" in the 120 minutes between 4 and 6 p.m. on the second day of the fire.

Deputy State Forester Metcalf in charge of the San Joaquin District, after nearly 40 years of command responsibility in wildfire fighting, expressed his views succinctly before the legislative committee. Said he, "One thing that is important to keep in mind is the fact---and it is still hard for me to comprehend even though I was present---that when the fire storm broke loose about 4:00 p.m. on July 11th, 20,000 acres were burned in less than two hours. By any method of arithmetic you may wish to use, you will find yourself in a position such as I am -- not being able to comprehend the explosive spread of this fire storm."

And later in his testimony, after describing the violent air turbulence he experienced in a helicopter observation flight at this time: "We returned to Usona Fire Station. We looked back toward the fire and saw an enormous cloud similar in shape to that developed by the dropping of an atomic bomb."

Dr. Keith Arnold of the Forest and Range Experiment Station declared that this fire storm had indeed generated an energy exceeding that of a five-megaton bomb. He presented to the committee the picture of critically unstable weather conditions further disturbed by mass heat convection currents of the fire, causing spot fires to be ignited ahead of the main sweeping fireline until all the numerous heat columns from the scattered sources combined and multiplied themselves into the massive fire storm. Firefighters testified: there was no longer any advancing fireline; fire was all around us.

By noon of the first day there had been no thought of a blow-up, but a campaign fire was surely under way. The fire's head was now a half mile beyond the point of origin and there was a mile and a quarter of fireline perimeter to be extinguished. Forces on the line which had been assembled within 100 total minutes of action now included five small crews, a medium bulldozer, a Youth Conservation crew. Fire Control Officer Ken Livingston of the Forest Service was there. On the road or in the air enroute were three more firetruck crews, two Conservation Camp crews, two bulldozers, additional "overhead" fire specialists, two tank equipped airplanes with a "bird dog" observation plane.

But the fire front advanced step by step ahead of the progressive build-up of forces to control it. At 2 o'clock it rolled over Stumpfield Ridge and rapidly increased the width of its head. The first serious spot fire dropped out of the sky a half mile to the northeast on the face of Peloni Mountain. By 10 p.m. the spot was well within the main fire. Farther south the first tongue of flame had crossed the Madera County line more than two miles from the starting point of that morning.

Then the bird dog reported another spot a mile away on the far slope of Miami Mountain at 4:56 p.m. This spot developed into an isolated wildfire of 2000 acres by 10 p.m. By dawn of the next day this was all part of the main fire with its advancing front, north, south, and east extended another half mile.

The Miami fire salient was a serious blow to the first grand strategy for control. In mid-afternoon of the first day the hope had been to attack eastward around the flanks - north and south - and press the widening front against the East Fork of Chowchilla River where there was considerable hope of holding it.

At 8 o'clock a strategy meeting was held at Usona Station where leaders discussed battle plans for an hour. Responsibilities and sectors were designated and confirmed. Crossfield would take over north of Chowchilla River. Ranger Bob Moran of Madera would take the line from Miami Lookout west through Metcalf Gap, over Crook Mountain and to the Chowchilla River. F.C.O. Flynn would build line north from Miami Lookout; the fire was already a mile into his National Forest along a three-mile front. Assistant Deputy Howard Moore assumed overall coordinating command.

In the meantime and throughout the night, from all over the San Joaquin Valley and beyond, men and machines were moving toward the Chowchilla River. Inmate crews from Folsom and Tehachapi and the Division's Conservation Camps were put on buses to be taken to the firelines or to stand-by on the perimeter. Fire business elsewhere in the District and the State was going on as usual. There was a big fire going near the City of Napa, and several others in the North Coast District. In the South a serious fire in San Bernardino National Forest held the concentrated attention of Division people in District VI. Most important in respect to the dispatch of aid to Harlow Fire was the dubious containment of the fire 70 miles north near Copperopolis called High 4, Number One.

By midnight 6000 acres had been burned and the fire perimeter was 23 miles in length. Dawn found 800 men, 31 firetrucks, and 15 bulldozers desperately trying to close the jaws of their trap around Harlow Fire.

But fatigue was swinging the balance in favor of the fire. Relief crews were not arriving on the line as rapidly as planned. The Crooks Mountain line was not fully "fired-out" to meet the anticipated onrush of the main fire. Borate drops had been somewhat curtailed because of air turbulence and blinding smoke.

Elsewhere the situation was good or fair. Kern County was sending two leaders who were personally familiar with the struggle against the Nelson Cove Fire over this same terrain.

At noon on July 11 the fire bosses were cautiously hopeful, even though 1800 more acres had been burned since daylight with a resultant additional mile and a half of fire perimeter along the eastern front.

All leaves of absence had been cancelled in the San Joaquin District. State Forester Raymond exercised his authority to prohibit the burning of debris or vegetation under the permits granted by field officers. Thirty-six firetrucks and 20 bulldozers were now working on the fireline around Harlow Fire.

Normal afternoon winds pushed the fire front up the slopes of Crook Mountain. Spot fires ahead of the line, and slop-overs and flare-ups along the front, were occurring so frequently as to give ample warning of very unstable weather conditions. But the high wind at about 5000 feet was a sinister factor unknown to the busy men on the ground. And so was the fact that ground fuel was passing from a state of high inflammability to one of almost explosive dryness. The conjunction of evil factors occurred at the hour of 4 p.m. on this July 11th. In the terminology of wildland firefighters, Harlow Fire blew up. The fire, and the local conditions of air, heat, and fuel which combine to support combustion had departed from the normal behavior trends of cause and effect known to the most experienced firemen. There was here locally developed what came to be termed in heavily bombed European cities of World War Two, a fire storm.

For two fearful hours the fire storm moved eastward in three major salient fingers through the areas of Nipinnawassee and Ahwahnee, burning homes and other property. Spot fires were kindled as far as three miles ahead of what seemed to be the advancing main front. Trained firetruck crews and volunteers turned their attention to saving whatever could be saved. Time after time the fireman turned from the flames in front of them to find that from somewhere unknown there was fire behind them.

Under such conditions it was miraculous that there were so few injuries and no lives of firefighters lost. The only dead were two residents who insisted, as many did, upon trying to save property after being advised to protect themselves first. Fortunately for all, Ranger Moran had earlier requested assistance from the State Highway Patrol and the Madera Sheriff's Office to warn residents and control traffic that can quickly become a nuisance to fire control operations.

Under such conditions the original grand strategy to control the fire broke down temporarily. Radio communication throughout the fire area became jammed with conflicting calls for aid and reports of destruction and impending destruction.

Those citizens who at first complained of unnecessary losses, discourteous treatment by officials, interference in their attempt to save

property at the risk of their lives, and so forth, came to change their opinion when the realization of what they had actually lived through was fully understood and reflected upon. Many of the complaints were found to have emanated from some hearsay source that later faded away upon direct questioning by Division officials. For the Division of Forestry, the growing problems involved with increasing settlement throughout highly inflammable mountain lands were severely accentuated. No comforting solutions were gained in this experience.

Between 5 and 6 o'clock, when the valiant isolated units of firefighters within the great fire area were still engaged at saving what could be saved, there were three organized frontal attacks launched against Harlow Fire. In the advancing center, Ranger George Phibbs of Tulare Unit with a small force aided by several bulldozers, Division and Disaster Office pumper trucks, split the fire's head and turned it around the resort community of Oakhurst and a valuable sawmill plant.

Southwest of Oakhurst, Assistant Ranger Al Kessler, assisted by Kern County crews, eight firetrucks and an inmate crew was reducing the force of the front by judicious backfiring and direct attack. On the northeast front old fire scars and cleared land came to the aid of flanking crews of firemen.

The firestorm ended quickly about 6 p.m. The quiet end seemed almost as spectacular as the violent beginning two hours earlier. At this time a total of 31,200 acres had been burned. Of the 63 miles of fire perimeter the fire bosses had to acknowledge that some 40 miles were now open and uncontrolled.

At 10 p.m. a general strategy meeting was held at Oakhurst. By this hour the responsible fire managers felt certain that the emergency phase was ended and they could proceed upon an organized plan of control at the fire perimeter. Forces were regrouped and deployed to finish the job. To the U. S. Forest Service men was assigned the northeast perimeter and the Division assumed the north line around the rear and along the south line.

Shortly before noon of July 12 the fire made its most serious run over the Bissett Ranch toward Highway 41. Borate planes, pumpers and hand crews had it safely under control by 10 p.m. The front generally southwest of Deadwood Peak edged forward until it was controlled about dark of that night.

Sixty hours after Harlow Fire had started it was officially pronounced contained. Its total perimeter extended for 74 rough and broken miles. On the 13th it was necessary to allow all Forest Service forces to withdraw because of a serious fire in the Kings River Basin of the Sierra National Forest.

Governor Brown declared the region an official disaster area; damage probably exceeded a million dollars. If all costs incurred by the fire control agencies during this fire were summed up it would be no less than 680,000 dollars. On December 12 a superior court jury determined that the youth who started Harlow Fire was not guilty of arson because there seemed to be no malicious intent and because the boy claimed he "told the fire investigators what they wanted to hear."



HISTORY OF AUSTRIAN GULCH. After the Franco-Prussian War in the 1870's a number of Austrian immigrant families settled on Loma Prieta Ridge on the upper slopes of what came to be called Austrian Gulch. They planted orchards and vineyards which prospered. Some of the men walked over the hill to work in the old Almaden Quicksilver Mine.

Then in 1889 a devastating cloudburst struck the highly erodible soil of the happy colony, washing away buildings and other property. The great wine vats burst when their foundations gave way, and Los Gatos Creek was turned red with fine wine.

The colony largely disintegrated and some families even returned to Europe. A few rebuilt their homes. Then in 1923 a forest fire ran down Loma and Mt. Madonna Ridge. Austrian Gulch Colony ended then. Today, old foundations and sometimes old grapevines under the brush are occasionally found where the prosperous colony once existed. Thirty-eight years passed without another serious fire on the Ridge. Then occurred the fire described on the pages which follow.

AUSTRIAN GULCH FIRE

The beautiful Santa Clara Valley has been one of the most desirable parts of California since the Spaniards of the 18th Century established the Pueblo of San Jose on the rich soil, back from the lower end of San Francisco Bay and near the Guadalupe River. Because the lower Valley is squeezed in tightly by a double range of mountains, to the west and east, the area is dependent upon its own watersheds to meet the constantly increasing demands for water. At first there was agricultural development and the need for irrigation water. Since the Second World War the Valley has become the fastest developing industrial area of this Nation, and water has become even more precious.

An inner ridge of the Santa Cruz Mountains which rise above San Jose to the west was long ago named Sierra Azul - "blue, saw-toothed range," but it is now commonly called Loma Prieta Ridge in recognition of the "black knoll" at its south end. The Ridge extends northwest from Loma Prieta about 10 miles and there breaks down in graceful descending ridges and canyons into the outskirts of the City of Los Gatos.

The Division of Forestry lookout tower at Loma Prieta is situated at 3800 feet above the sea which is visible along the shore of Monterey Bay southeastward. Most of the Ridge maintains an elevation of 3000 to 3400 feet.

Midway along the Ridge and $4\frac{1}{2}$ miles from Loma, a rounded peak protrudes to the east, hanging over the several canyons which drop steeply down into Almaden and Guadalupe drainages. This is Mt. Umunhum which was undoubtedly named by the local Indians. Presently there is situated at this point an important Air Force installation. The basic reason for the occurrence of a fire under the south shoulder of Umunhum, at 26 minutes after 5 p.m. on the afternoon of July 18, 1961, is believed to have been related to the military installation and its power line delinquency at that particular spot and time.

Dense brush and woodland clothe the land surface of practically all of the Loma Prieta country, except where a few apple orchards or vineyards have been chopped out of the natural vegetation. Down in the water courses which drain away in every direction from the mountain top valuable dams have been constructed to collect every possible drop of free running water. Keeping fire from destroying those watersheds has been the serious task confronting the Division for about 40 years; and the project has enjoyed considerable success.

During the month of June, Ranger George Britton and his crews had been heavily engaged with fires in his Santa Clara Unit. Six days before the trouble at Umunhum, a lightning storm struck fire on Bollinger Mountain over in the rough and thinly settled land between Mt. Hamilton and the San Joaquin Valley. Five days later the 19,000-acre fire which developed there was brought under control. Local crews were beginning to show signs of cumulative exhaustion.

Before the Bollinger Fire had been under control for a full day, and while it still required heavy patrol, the small fire at Umunhum was sighted by Lookout Cy Waite on Loma and reported to Britton. The Ranger well knew

the potential for watershed destruction inherent in an uncontrolled fire in that place so he made an observation flight over the fire promptly after receiving the report.

Assistant Ranger Charles Coomber had organized an immediate attack and was on the fire 13 minutes after first report. When his crews arrived 25 acres of dense brush had already been burned down in Austrian Gulch at the 2000-foot level. This steep drainage lunges into Los Gatos Creek, making an 1800-foot fall in two miles. Los Gatos Creek then continues northwest a few miles and deposits its valuable water in Lexington Reservoir. Immediately upstream from the mouth of Austrian Gulch are two small reservoirs, Elzman and Williams by name.

On this late afternoon of July 18, at Loma Prieta Lookout the temperature was 86, humidity 14, and a northwest wind was blowing at 18 miles per hour. Fortunately, the fire down in Austrian Gulch was sheltered from the firm wind moving across the exposed faces of Loma Ridge.

The behavior of Austrian Gulch Fire and the battle to control it was selected as a narrative subject, not because of the actual damage incurred, the area burned, or because of the painful cost of the suppression effort. All of these were significant, but they have been duplicated in other wildfires. This particular fire had a history of upside down weather and terrain not common to most such fires.

Phases of the weather will be explained as the action progresses. In regard to the land surface burned over the primary feature can be expressed in these admittedly general terms. Practically all fires have a history of running uphill if any flammable hilly country is involved. Austrian Gulch Fire in its wildest period was burning on top of a broad ridge and spreading downhill all around.

If the vegetation had not been so high and dense, and the sidehills not so steep it can be assumed that this peculiarity would have been to the advantage of the firefighters. Fires burn more slowly downhill, other things being equal. However, one general fire control axiom must be kept in mind. The so-called undercut line is a thing to abhor. In simple terms this means that a fireline cut horizontally across a hillside presents the constant hazard of burning material rolling over the line. Establishing control of Austrian Gulch Fire in this respect was much like wrestling with a perverse octopus. Its tentacles were continuously probing outward around the entire fire perimeter.

Ranger Britton immediately appreciated the difficulty of his situation, especially in view of the physical condition of his own forces. He promptly requested assistance through District Headquarters at Monterey and thence to the Central Dispatcher at Sacramento. Help was dispatched from both centers within minutes. Before this fire was mastered, Division crews and supervisory personnel from Oregon to Mexico were engaged. From Sacramento and each of the six District Offices men trained in various aspects of fire control traveled to Loma Prieta; 27 of the 30 Division Ranger Units were represented, as were 19 of the 27 Conservation Camps.

The first crews under Coomber's direction worked with hand tools in the dense brush along the precipitous slope on the underside of the fire. Generally the fire advanced slowly up the ravine, although occasional

erratic down drafts of wind were noticed by the firefighters. It was extremely difficult as well as dangerous to work close against the edge of this fire. There were no spectacular runs by the fire at this time but the entire perimeter was active and "hot" throughout the night.

Use of air attack was not overlooked by any means. In fact, within 15 minutes of first report several loads of chemical retardant were dropped on the fire area. These airtankers had been rather hastily based at Hollister for use on the Bollinger Fire. On the evening of July 18 it was quickly determined by the Fire Boss that their use was not very effective because of the terrain and, of course, because of approaching nightfall. However, during the night Equipment Engineer Waklee had been intensively engaged in assembling more planes, men and material at Hollister to intensify the attack the following day.

Around midnight bulldozers were directed to probe down and into the fire area with the intent of cutting off its upper head. Near dawn there was a moment of high elation when flames and equipment approached each other along a minor ridge. However, only a portion of the hot line could be reached by the heavy equipment. Nevertheless, the situation appeared reasonably favorable at this time. The fire was not very active and only 160 acres had been burned.

Daylight of July 19 indicated that access to the head and rear of the fire was possible, so crewmen were sent to the fireline as rapidly as they became available. Military personnel from the local station were also assigned to aid. Unfortunately, the fire being where it was there was difficulty in keeping a supply service up to desirable standards. In fact, an unavoidable failure in supply a few hours later is judged to have turned the balance of power in favor of the fire. This involved both air attack and ground forces.

Assistant Deputy State Forester Len Chatten had arrived at the fire scene about midnight of the 18th in company with several other "overhead" from Sacramento. Chatten's major interest during the last four years had been fire suppression from the air. This situation presented for him an excellent opportunity to test a theory developed from the Division's observations to the effect that frequency of air drops is more important than volume of retardant placed at the head of a fire. He was asked to supervise air operations so he gave the order that the next day every effort should be bent toward accomplishing 12 drops per hour regardless of the type of aircraft used.

Airtanker drops began at 7:15 a.m. and within three hours the frequency objective was reached. Radio equipped observers on the ground maintained good communication with the pilots. As time progressed one hot spot after another was reduced by a spray of chemical from the air. There was no fierce activity remaining around the fire perimeter in spite of the density of the vegetation.

But two opposing conditions were reaching a culminating climax. The air monsters (PBY, F7F, TBM models) were devouring fuel and chemical payloads at a rate out of proportion to the facilities established to feed them. Planes had to be dispatched to far airports to refuel. This caused a severe reduction in delivery of retardant drops on the fire.

In the meantime fatigue and increasing heat were obviously having a deteriorating effect on the weary crews along the fire. Hot flareups became frequent and sections of line, earlier thought to be secure, began to break away.

Bulldozers were steadily at work building a 100-foot firebreak on a main ridge off to the west on the vulnerable flank of Austrian Gulch. Night of July 19 descended on a hot line, increased in perimeter, with only a portion of the old dozer line holding at the head of the fire.

During the night of July 19 the constant strong winds out of the northwest became stronger, reaching 35 miles per hour by 10 p.m. In the early evening Oakland Weather Bureau had recorded a sudden drop in humidity which was totally unexpected. Other stations were making the same readings. Obviously, an extremely dry air mass was moving toward interior California.

Over the ridges of the fire area this upside down night condition was creating a turbulence of dry cold air. The fire responded with violent runs at numerous points. Near midnight several salients of flame ran toward the bulldozed firebreak on the southwest flank of the fire in a direction contrary to the prevailing winds. Then the southeast flank exploded and became the major head of the fire.

No longer was the fire confined to sheltered Austrian Gulch; most of it was up on the exposed top of Loma Prieta Ridge and subject to the whims of unusually perverse and dry wind currents.

At 3:25 a.m. all crews were ordered off the lines for their safety and because their effort was obviously being wasted in a wild fire running loose. At 6:30 a.m. on July 20th, the fire bosses surveyed the situation and agreed that the entire perimeter of their 600-acre problem was uncontained and posing the threat of driving out fast at any or every point of the compass.

The supervising organization and the forces assembled had been consistent with the growing needs up to this point. Now it was obvious that a complete reorganization of management and a reorientation in the plan of attack was required. Tremendous values in resources and structures surrounded the fire and all of it was vulnerable, especially if such perverse weather conditions prevailed.

Deputy State Forester Emery Sloat, in charge of the Central Coast District, arrived and was present for the remainder of the heavy action. Ranger Britton recognized that Coomber was exhausted and ordered him to return to headquarters and help reorganize remaining Unit forces to meet possible fire emergencies arising elsewhere. Assistant Deputy Chatten at this time was asked to assume overall direction of Austrian Gulch Fire.

Britton now kept himself free to enter into major fire control strategy and to deal with external elements and problems. Other local agents of government and civic groups were beginning to take an intense interest in the fire, and the coordination of their contributed efforts was as necessary as finding logical answers to their complaints. One immediate chore was an explanation of the hazard to adjacent property owners so that rescue work or evacuation would not develop into panic

should either become necessary. The Swedish colony of Sveadal down in Uvas Creek in the direct path of the advancing head of the fire was a primary concern.

Fire Boss Chatten appointed Ranger Gervice Nash of the State Forester's staff as his Line Boss at Britton's suggestion. Nash had formerly been Britton's assistant in this Unit. In the meantime, Ranger Lester Gum of Santa Cruz Unit had arrived and was proceeding to construct a bulldozer line along the Santa Cruz County boundary on the south side of the fire.

As the reorganization was being planned after dawn on July 20, day shift crews and all available relief forces were committed to delaying and holding action on the hottest portions of the perimeter. The dimensions of the problem were so obvious at this time that the request for bulldozers, firetrucks and manpower probably exceeded any similar request in the history of the Division of Forestry.

Fire Management Headquarters were established at the Almaden military station on Mt. Umunhum where Major R. K. Grier, the Commanding Officer, immediately asked permission to observe the logistics and tactics of this peculiar warfare. It wasn't long before he commented that this enemy was especially tough because it had no reasoning power to be outsmarted by the defense. At another time he presented Chatten with a handful of cigars.

"Thanks, but why?" asked Chatten.

"Because I've noticed that things seem to be going better when the Fire Boss is smoking a cigar," said the Major.

A sharp defense of the military station was required at midday on the 20th. Because the heaviest and freshest forces available at that time were deployed along the main head off to the east, this particular battle was successfully conducted by tired night shift crews, military personnel, and all the specialists and unassigned bodies that could be quickly rounded up. One anxious moment occurred when some high military brass arrived at the scene in a helicopter at the worst possible moment. Fortunately, low flying borate planes did not collide with the visitor.

On this day a mobile forecasting unit of the U. S. Weather Bureau arrived at headquarters, and the first California Disaster Office firetrucks also reported to the Timekeeper.

During the afternoon the fire had driven on to Loma Prieta Lookout. In the early evening its hot perimeter was moving slowly into the drainages of Soquel, Uvas and Llagas on the eastern front. On the northeastern sector the fire was creeping down into the dense vegetation in the upper Almaden drainages. Very little of the fire perimeter was secure. If it made a similar run the next day the difficulty of control would be greatly aggravated because of precipitous terrain and the numerous drainages that would be involved in the fire.

The community of Sveadal was ordered evacuated by law enforcement authorities.

On the evening of July 20 it was determined that the best strategy to cope with the unknown potentiality of fast runs at any point of the fire perimeter would be to organize separate cohesive working units into designated zones.

Ranger Gum was ordered to maintain his position on the southern flank, with Fire Camp No. 2 established at Loma Prieta School on Burrel Ridge. Assistant Deputy H. P. Reinecker was assigned the eastern or Loma front which now appeared to be the prime head of the fire. Ranger John Wade of Monterey Unit was appointed Zone Fire Boss of the Almaden Slope.

Throughout the night of July 20 a constant stream of equipment was brought to the fire. This developed a tremendous problem of identification, coordination and assignment. Equipment men worked all night under great pressure, examining and marking bulldozers and other heavy equipment units. One unusual procedural hazard was reported during this task. Some confusion in the number of bulldozers on hand was discovered to have been caused after the painted temporary number on the side of one dozer was obscured by a load of borate from an airtanker - leading the harrassed timekeeper's assistant to squirt on a new and different number with his pressurized paint can.

Sixteen pumper trucks of the California Disaster Office were on the job, especially to be available for structural fires. Ranger Ross Dunwoody was made liaison officer to coordinate the duty assignment of this equipment.

One of the major lessons absorbed by Division fire officials during several seasons of many large fires is the necessity of relieving the Fire Boss of extraneous duties and of detailed responsibilities. A solution to part of the problem is the assignment of assistants to maintain a liaison with various elements and groups sending men or material to help in fire control work. Another vitally important attachment to the Fire Manager wherever public interest runs high is the Public Information Officer. Such a staff detail was ready to function on a 24-hour basis when a small army of newsmen and photographers descended - ascended, that is - on Loma Prieta Ridge after the blow-up of July 20th.

During the early hours of the 21st, north winds began to diminish and the humidity rose above the recent abnormal lows. Line personnel concentrated on finding and orienting equipment which had been scattered during a busy night of hitting the fast moving fire and constructing delaying lines wherever it seemed profitable.

Ranger Clint Phillips reported by radio during his helicopter dawn patrol that the eastern head was full of life but moving slowly. The south zone fireline had moved forward but bulldozer lines were holding. On the Almaden Slope spasmodic flames indicated the unhappy truth that fire was hanging there along the precipitous wall, the sort of thing that firefighter's bad dreams are made of. Zone Boss Wade must probe the face of the mountain to seek natural features for the construction of lines that might hold.

Fire Boss Chatten saw the leading task of the day to be the construction of a "hook" around the eastern front in Reinecker's zone from the County Line to Mt. Chuai vicinity. Thereafter he would be free to

concentrate on the Almaden Slope. Priority of work was thus established for July 21. But as the hours passed it began to appear that transfer of men and equipment from other parts of the perimeter, where they had been heavily engaged during the night was not progressing fast enough.

Two fire salients penetrated deeper into Uvas drainage. Concentrated air attack and two long hose lays were undertaken to hold these runs during the night of July 21-22. At dawn someone remarked at the Maps and Records desk that the new front line resembled a dragon's head with its open mouth poised over little Sveadal.

A peculiar weather transition now changed day and night conditions more than ever away from the anticipated summer norms. Ocean fogs rolled over the valleys during the night and crept up the slopes almost to the summit of Burrel Ridge. Above this damp fog bank a strong inversion air blanket stretched like an invisible membrane, maintaining a layer of warm dry air over the fog bank.

The entire active fire area was within this warm night air mass. Temperatures throughout the night registered in the 70's, which is unusually warm so near the coast. On the night of the 21st humidity was 12 percent; on the 22nd 7 percent. One night a low of 4 percent was noted.

As each morning sun began to dissipate the fog under these conditions, air above the fog naturally acquired more moisture. Humidity readings around the fire rose correspondingly. This upside down condition caused severe fire runs at night and a nuisance during the day.

In this topography and vegetation it was quite necessary that blocks of standing vegetation or accumulated debris near the edge of prepared lines be "burned out" during low intensity burning periods in order to strengthen the fire barriers. Because of the "reverse" weather conditions it was quite impossible to burn some areas in daylight that would make a glorious wildfire come nightfall. This was true in spite of the fact that on this mountain much of the vegetation had been seared and dried by the long drought suffered by California.

Under such unpropitious conditions began the battle of Chuai Ridge.

BATTLE OF CHUAI RIDGE

Mt. Chuai is a modest loma at the end of a ridge extending northeast from Loma Prieta nearly a mile. The summit of Chuai is 300 feet lower than the lookout. To the east of Chuai spur ridge the Llagas (yah-gus) drainage descends rapidly. On the west side, steep and heavily vegetated Barrett Canyon drains due north into Almaden Reservoir.

This ridge was the natural topographic break where the eastward moving fire could be stopped before it descended into the Llagas and thereafter burn probably an additional ten thousand acres.

The fight to hold the fire west of Chuai Ridge occurred during the four days of July 22nd through the 25th. Many times the issue was in doubt.

While the effort was being made to stop the eastward advance of fire at Chuai Ridge it must be remembered that the fire's northward

Year 1928 - Looking southeast down Soquel Creek from near Loma Prieta. Note fire-crowned redwood remnants in protected gulches five years after disastrous 1923 fire.



1928 - Orchard on Burrel Ridge is severely threatened by excessive erosion. The history of Austrian Gulch colony should have warned this landowner. Note Douglas-fir on horizon, the natural resident of this site.



advance, down the steep Almaden Slope, posed an equally serious problem of strategy. Not only was valuable watershed being destroyed, there was the constant threat of the fire completing its own outflanking move, that is, rounding the corner north and below Mt. Chuai, and running thence eastward into the broken and timbered drainages of the Llagas.

All bulldozers that could be diverted from other sectors were put to work removing potential fuel along Chuai Ridge. During the day airtankers were employed in spraying borate retardant over vegetation near the front of the fire where spot fires or runs might be expected during the night. Secondary lines were constructed where holding actions could be initiated if the primary line failed. The order was: Give up no more area than necessary, but keep the fire west of Chuai Ridge.

Zone Boss Wade found it necessary to report that probing action along the high Almaden Slope showed little chance of holding the fire there.

An attempt was made to reduce the intensity of flaming hotspots by dropping borate from a helicopter with the intention of sending ground crews in to hit the spots immediately. Fuels were so heavy and deep that the operation proved unfeasible. Meanwhile, Wade had started the construction of lines down Herbert Creek and Barrett Creek with bulldozers, timber fellers and hand crews.

It seemed inevitable that the final burned area must at best embrace all of the steep upper Almaden Slope. With this acknowledgment the strategy of clinging to Chuai Ridge became more than a holding action.

While the fight went on to meet fire thrusts against Chuai Ridge out of Barrett Creek, the water pumping strength of the control forces was being built up. Seven mother tankers, mostly contributed by the Santa Clara County Road Department, began the continuous long haul of hundreds of thousands of gallons of water out to the middle of the ridge. In the meantime the bulldozer construction of firebreaks along every likely spur ridge under the active fireline was proceeding on the broad Almaden Slope.

Firebreak Ridge now developed into a very important topographic feature in the current strategy because it split the north zone into two drainages. This ridge had obtained its name from an old fire trail down its entire length. It extends due north from Loma Ridge a distance of two and one-half miles, with a drop of 2500 feet, into lower Herbert Creek. The old break was now cleared of recent vegetation by dozers and hand crews.

It seemed reasonable to hope that all eastward flanking movements of the fire burning west of Firebreak Ridge could be resisted along this prominent topographic break. This proved to be true.

So long as the fireline along Chuai Ridge were holding there remained the active fingers of fire down in upper Barrett Creek as the principal source of trouble. The eastern arm of the "hook" around Loma Prieta, from the County Line as far as Mt. Chuai, seemed reasonably secure.

But even this partial containment of the fire was not a situation to be trusted. As a matter of fact, shortly after midnight of July 24 it almost proved to be a weak assumption. The line broke under Mt. Chuai and the fire was on its way into Twin Fall Creek of the Llagas drainage. Fortunately, three crews of Conservation Camp men resting after a hard day's work were near enough to be rushed onto this break and bring it under control before dawn.

The last major attack on the fire started early on the 25th. Ranger Wade from the east on Firebreak Ridge and Reinecker from Mt. Chuai began to close the gate across Barrett Creek. All available tools were put to the task. Bulldozers worked as far downslope as possible, then hand crews took over. A total vertical drop from Mt. Chuai of 1500 feet into Barrett Canyon complicated the action.

Now the long hose lay was developed. "Firing-out" along portions of the line began on July 26th, even before the fireline was completely cut across the canyon. Between 40,000 and 50,000 gallons of water were delivered through the hose lines each of these active days; 12,000 feet of 1½ inch line and 5000 feet of one inch line were used in one continuous lay. In addition to the seven nurse tankers, seven pumper trucks were employed.

In such a project, many problems in the field of hydraulics must be surmounted; water pressure is a powerful force. Halfway down the hillside a portable surge tank was installed to relieve pressure from the lower hose line. It did not remove enough pressure to keep some hoses from bursting; nozzles along the way had to be cracked to remove the pressure.

Once started, the hose lay was kept in continuous night and day operation. This was an extremely important defense weapon during the forced firing operations carried out during the day of July 26th. By evening of July 26 the final line around Austrian Gulch was completed. Flare-ups within the perimeter were still common, and wherever possible dangerous islands of vegetation near the line were burned out.

When dawn came on July 27th, 1000 men around the 14 square miles of blackened smoldering fire scar could relax for the first time in nine weary days.

Mopping up around the fire was a tremendous job in itself. The wide dozer lines cut along ridge tops through heavy vegetation caused great "cat-piles" to exist on both sides of much of the fire perimeter. These piles of dirt were mixed with tree trunks and brush stems that could smolder and carry fire for months. The piles had to be broken up and made safe.

Constant patrols were kept on watch around the old line. In fact, this continued for almost four months until heavy rains on November 20th drenched the area.

Austrian Gulch will not rank among the most devastating and largest wildfires in California history by any means. It had in it, however, a great potential for damage, and much erosion damage may yet be suffered in spite of prompt action to reseed the most vital slopes.

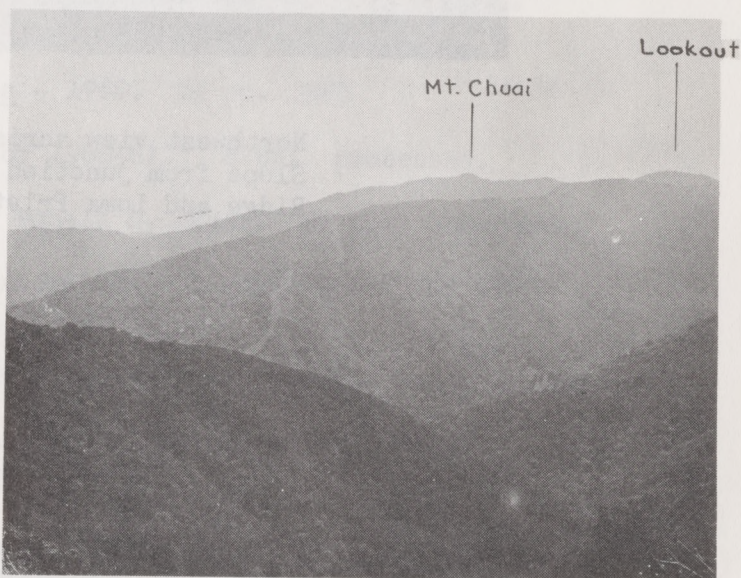
For concentrated control effort assembled it is likely that Austrian Gulch can be claimed as a record, at least for the California Division of Forestry. There were 67 bulldozers (of which 59 were hired from private parties). There were 19 aircraft, including 13 tankers, 2 dropco (drop-coordinators) and 4 helicopters. Airtankers made 443 flights and dropped 285,000 gallons of fire retardant chemical. On the day of the big run, July 20, 44,100 gallons were dropped.

From 68 firetrucks a total of 60,000 feet of hose was laid on the fireline. As mentioned heretofore, crews and men from Division stations throughout the entire State were assembled here on Loma Prieta Ridge. Most of them will remember for a long time the small part of the battle each could see unfolding. To those warriors not mentioned in this brief narrative: Greetings, and Well Done.

Looking westward across
East Fork of Austrian Gulch
from Loma Prieta Ridge.
April 1962



Firebreak descending
lower end of Firebreak
Ridge



Bulldozer line reaches
Los Gatos Creek above
Williams Reservoir.





Northwest view across Almaden
Slope from junction Firebreak
Ridge and Loma Prieta Ridge.



Head of Uvas Creek under Loma
Prieta Lookout. This valuable
Watershed has grown a dense
cover since 1923.

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